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Autoethnographic Journey of Academic Writers as Multilingual Learners in Neural Machine Translation: Human-AI Assistance or Flawed-AI Tool?

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الملخص

في عصر تتوسط فيه التكنولوجيا بشكل متزايد في البيئات الأكاديمية والتعليمية العالمية، أصبح دمج أدوات الترجمة الآلية العصبية (NMT) مثل DeepL Translator أمرًا لا غِنى عنه للمتعلمين متعددي اللغات. تعمل هذه الدراسة على سد فجوة تجريبية من خلال استكشاف الاعتبارات والمعضلات التي تنشأ لدى متعلمين متعددي اللغات عند دمج الترجمة الآلية العصبية (NMT)، وتحديدًا DeepL في كتاباتهم الأكاديمية من خلال الإثنوغرافيا الذاتية التعاونية (CAE) كطريقة نوعية. من خلال السّرد الشخصي لشقيقتين من أصول يمنية وإندونيسية تأثرتا بتنشئتهما المتعددة الثقافات ورحلتهما التّعليمية، كشفت هذه الدراسة عن موضوعات رئيسية، بما في ذلك الاعتبارات الأخلاقية (على سبيل المثال، الحساسية الثقافية والتحيز الجنسي)، والاعتبارات التعليمية (على سبيل المثال، الاعتمادية في التعلم، والموازنة بين المساعدة والاستقلالية، وأهمية تقديم التغذية الراجعة والتنقيح)، والاعتبارات اللغوية (على سبيل المثال، الغموض والاختلافات اللغوية المحلية). تساهم هذه الدراسة في إنشاء أساس لصقل تقنيات الترجمة الآلية العصبية (NMT) وتطوير استراتيجيات لدعم متعلمين متعددي اللغات، وتقديم إرشادات عملية للتغلب على تعقيدات الكتابة الأكاديمية بمساعدة الترجمة الآلية العصبية (NMT) مع ضمان النزاهة الأكاديمية والكفاءة اللغوية.

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Abstract

In an era where global academic and educational settings are increasingly mediated by technology, integrating Neural Machine Translation (NMT) tools such as DeepL Translator has become indispensable for multilingual learners. This study bridges an empirical gap by exploring the considerations and dilemmas that arise for multilingual learners when incorporating NMT, specifically DeepL into their academic writing through a collaborative autoethnography (CAE) as a qualitative method. Through the personal narratives of two siblings from Yemeni and Indonesian backgrounds influenced by their multicultural upbringing and educational journey, this study revealed key themes, including ethical considerations (e.g., cultural sensitivity and gender bias), educational considerations (e.g., learning dependency, balancing assistance with autonomy, and importance of feedback and revision), and linguistic considerations (e.g., ambiguity and local language variations). This study contributes to establishing a foundation for refining NMT techniques and developing strategies to support multilingual learners, providing practical guidance to navigate the complexities of NMT-assisted academic writing while ensuring academic integrity and language proficiency.

Keywords: *academic writing; autoethnography; DeepL translator; multilingual learners; neural machine translation (NMT)*

Introduction

In recent decades, the field of translation has undergone a profound transformation with the advent of the Neural Machine Translation (henceforth, NMT). Traditional translation methods, such as Rule-based (RBMT), Example-based (EBMT), and Statistical Machine Translation (SMT), were limited by their reliance on predefined linguistic rules and large corpora of parallel texts (Wang et al., 2022). However, the development of NMT marked a significant shift towards more sophisticated and context-aware translation systems (Mohamed et al., 2021). The history of NMT was presented in 2014 and developed in 2017, marking a departure from conventional phrase-based and statistical approaches, allowing for the translation of entire sentences or paragraphs more holistically (Kenny, 2022).

NMT systems offer a practical solution for overcoming language obstacles in academic settings, specifically academic writing. NMT can potentially simplify the writing and publishing of academic work in multilingual settings (Steigerwald et al., 2022). Multilingual researchers can leverage NMT tools in navigating the complexities of academic writing, providing real-time translation assistance as they engage with scholarly literature and produce their academic texts. By facilitating access to resources and fostering cross-cultural exchange, NMT has the potential to enrich the academic experience for multilingual researchers and contribute to the global dissemination of knowledge. Furthermore, NMT's ability to provide feedback on written compositions can aid learners in improving their writing skills by highlighting grammatical errors, suggesting vocabulary alternatives, and offering stylistic suggestions (Chung & Ahn, 2022).

NMT has demonstrated impressive capabilities in generating high-quality translations, yet current systems exhibit limitations regarding consistency and reliability. Specifically, NMT output variability is often attributed to lexical or syntactic modifications caused by input fluctuations, leading to substantial discrepancies in translation quality (Weng et al., 2023). The use of NMT in academic writing can potentially compromise the integrity of the writing process and lead to transgressions. Academic writing has been affected by NMT in different ways, which can be attributed to a range of factors such as human capacity and purpose, advancements in technology, and organizational reactions toward transitions (Dusza, 2023). Moreover, it is crucial to acknowledge that NMT systems may not fully support all languages equally. While major languages often receive robust support and frequent updates, lesser-known or less widely spoken languages may not have access to the same level of translation accuracy or functionality (Donaj & Kačič, 2017). This disparity in language coverage could pose challenges for multilingual researchers who work with not well-supported languages in NMT systems from fully engaging with academic literature and producing high-quality scholarly texts. Therefore, the accessibility and inclusivity of NMT tools across diverse linguistic contexts should also be considered when evaluating their utility in academic writing settings.

To expand the scope of this study, numerous studies have examined the use of NMT tools in various contexts, emphasizing their potential to bridge linguistic gaps and facilitate cross-cultural communication. For instance, a study has highlighted that document-level NMT models have emerged to incorporate wider document-context and inter-dependencies among sentences, enhancing the translation accuracy and coherence of longer texts (Maruf et al., 2021). A study conducted by Wang (2022) on cultural translation based on neural networks, particularly in the context of translating cultural texts, such as those related to Shaanxi's red tourism culture, to promote cultural exchange and understanding. NMT has also been tailored for specific linguistic contexts, such as Indian languages, where the availability of parallel corpora and the ability of NMT systems to analyze context have led to fluent translations (Pathak & Pakray, 2019). However, an empirical gap exists in the literature concerning the specific experiences of multilingual learners in the academic writing domain and the intricate challenges they face when employing NMT tools, specifically DeepL software, as part of their writing toolkit.

Given the transformative potential of NMT in facilitating multilingual communication and scholarly endeavors, it is imperative to understand the nuanced challenges and opportunities it presents to learners engaging in academic writing across languages. This autoethnographic study explores the considerations and dilemmas that arise for multilingual learners as a result of incorporating NMT into their academic writing. The current study contribution lays the groundwork for future research endeavors aimed at refining NMT technologies and developing pedagogical strategies to address the specific needs of multilingual learners. In addition, this study provides practical insights and guidance for multilingual learners navigating the complexities of NMT-assisted academic writing. This empowers them to effectively utilize NMT tools while maintaining academic integrity and fostering language proficiency. Thus, the research question driving this inquiry is: What considerations and dilemmas arise for multilingual learners from integrating NMT into their academic writing?

Literature Review

Brief Overview of Machine Translation Approaches

Machine translation (MT) has evolved considerably since its inception in the mid-1940s, as different approaches have been developed to address the complexities of interlingual translation over the years (Hutchins, 1995, 2001). Rule-based machine translation (RBMT) is recognized as one of the earliest machine translation approaches, relying on a comprehensive set of linguistic rules for text translation. While it can produce syntactically well-formed translations, it is often criticized for being time-consuming and challenging to scale, particularly when dealing with large corpora of unrestricted text (Okpor, 2014). A study by Chen and Eisele (2010) demonstrated that while RBMT excels in producing grammatically correct outputs, its integration with Statistical Machine Translation (SMT) significantly enhanced translation quality, especially in German-English tasks, addressing RBMT's scalability issues. In contrast, Example-based Machine Translation (EBMT) utilized example-based techniques, drawing from a bilingual knowledge bank to generate translations (Hutchins, 2005; Turcato & Popowich, 2003). This emphasized the significance of linguistic principles and has shown that scaling up data can enhance translation quality.

Statistical Machine Translation (SMT) represented a pivotal advancement in the field of MT by relying on statistical models derived from extensive parallel corpora (Hearne & Way, 2011). This approach allowed for more accurate and contextually appropriate translations than earlier approaches such as RBMT, which used predefined linguistic rules, or EMBT, which focused on pre-seen sentence similarities. Within SMT, Phrase-based Translation (PBT) has emerged as a particularly effective technique, translating phrases rather than individual words, significantly improving overall translation quality (Zens et al., 2002). Furthermore, the integration of hierarchical phrase-based models further enriched PBT by enabling the capture of non-local phrase reorderings. The authors successfully identified phrase boundaries that indicate the start and end of phrase reorderings by developing a maximum entropy-based classifier, which it subsequently employed as soft constraints during the decoding process (He et al., 2010).

In recent years, the emergence of Neural Machine Translation (NMT) has marked a significant leap forward in MT technology, which has largely replaced SMT. NMT utilizes deep neural networks, specifically an encoder-decoder architecture, which has simplified the translation process by treating it as a single end-to-end task rather than relying on multiple components as in SMT (Mohamed et al., 2021; Stahlberg, 2020). This shift has led to significant improvements in translation quality, particularly for long sentences, due to the introduction of attention mechanisms that allow the model to focus on relevant parts of the input sentence during translation.

AI-Translation as Cultural and Linguistic Mediation

The advent of artificial intelligence (AI) in the translation domain has brought significant attention to its role as a mediator in cultural and linguistic contexts. While intercultural mediation in translation is not a recent expansion, integrating AI introduces distinctive complexities and opportunities to this multifaceted domain. The role of translation in intercultural communication is multifaceted, with overt and covert translation paths influencing how cultural elements are transferred and how global English impacts discourse norms in various languages (House, 2020). The overt translation preserves the cultural nuances of the source language, while the covert translation adapts the content to fit the cultural context of the target language. However, the rise of global English and its dominance in translation have raised concerns about the influence of Anglophone norms on other languages.

There is a risk that these norms may 'shine through' in translations, potentially suppressing the cultural uniqueness of the target language. Despite this, some studies suggest that indigenous discourse norms can remain intact, indicating a resilience of cultural identity within translation. Furthermore, the contemporary media landscape has reshaped translation theory, advocating for a mediation-based approach that transcends the traditional focus on language. This perspective, rooted in Peirce's semiotics and further developed by Elleström, defines translation as the transfer of cognitive import through various media effects (Olteanu, 2020). It challenges the dominance of language-centric translation theories and promotes an embodiment-aware approach to avoid the pitfalls of cultural and language relativism.

Translators and interpreters act as cultural mediators, especially in complex situations, such as peacekeeping missions, where they must navigate cultural idiosyncrasies and local

customs to ensure accurate and meaningful translation (Shala, 2019). Another study by Nagodawithana (2020) indicated that translators often face the daunting task of navigating through cultural barriers to deliver a message that resonates with the target audience while retaining the essence of the source text. The integration of translation technology into this process introduces both opportunities and challenges. The socio-technical-cultural system perspective highlights the importance of human translators collaborating with translation technology (Li et al., 2020). Translation AI should not only facilitate language translation. It should also respect and promote cultural understanding.

The subjectivity of human translators and the cultural configuration of translation technology are crucial for improving usability and ensuring the efficacy of translation AI as a proficient cultural mediator. In a study in the language learning and teaching context revealed by Moqadem and Koumachi (2023) translation has been re-evaluated as a pedagogical activity, with mediation skills becoming increasingly important for global citizens to maintain communication across linguistic and cultural barriers. Overall, AI translation has the potential to facilitate cultural and linguistic mediation, but it also poses challenges and limitations that must be addressed. Developers and users of AI technology must be fully aware of its potential biases and pitfalls, and this knowledge must be incorporated throughout the AI system development pipeline that involves training, validation, and testing.

Brief Overview of Multilingual Learners' Engagement in Academic Writing

As the academic landscape becomes increasingly globalized, multilingual learners face unique challenges in mastering academic writing. At a Qatar-based English-medium university, a longitudinal study reveals the hurdles multilingual students encounter while honing academic writing skills over time in English (Pessoa et al., 2014). Despite initial difficulties in comprehension and language nuances, these students exhibit notable progress by displaying enhanced academic registers, more sophisticated language, details, and arguments in their writing.

Another study investigated how multilingual students in their first year at an Australian university view academic writing as a multifaceted process involving skills acquisition, interpersonal dynamics, self-representation, and identity construction (Morton et al., 2015). It also highlighted the various sources and strategies students use to enhance their writing abilities and identities, both within and outside the academic domain. A yearlong case study of multilingual writers in residence indicated how they struggle to meet academic standards while expressing their authentic selves in their essays (Wight, 2017).

Writing college admissions essays is a complex task for multilingual writers to deal with the cultural and linguistic differences between their identities and target audiences. Furthermore, a study conducted by Marshall and Marr (2018) at West Coast University in Vancouver, Canada, highlights the difficulties multilingual students experience in Writing Intensive (WI) classes, specifically when writing in English as an additional language. Instructors in these classes face pedagogical dilemmas and conflicting professional identities as they attempt to accommodate linguistic diversity while maintaining academic standards.

A study by Kafle (2020) at a university in the United States investigated how multilingual undergraduate students perceive language mixing in academic writing. It revealed that multilingual undergraduate students avoid language mixing in academic writing because of its implications for the genre of academic writing, the student's self-identity, and the intended communicative purpose within academic discourse, even though they often use multiple languages in everyday interactions. Langum and Sullivan's (2020) study investigated the intersection of multilingualism and academic writing in the context of Norwegian doctoral researchers, emphasizing their perceptions of language choice, adherence to academic writing norms, and the establishment of virtual transnational communities via multilingual academic discourse, revealing positive strategies employed by some researchers to overcome challenges in writing English as a non-native language and emphasizing the importance of effective communication in both local and global contexts.

The intricacies of writing in English as an additional language (EAL) are particularly pronounced for doctoral students, as evidenced by a study at an Australian university. EAL doctoral students encounter difficulties with academic writing due to linguistic and socio-cultural factors, such as translation dependence, rhetorical variation, and adaptation difficulties, which require specific interventions from language experts and supervisors (Ma, 2021).

DeepL Integration as the Selected NMT Tool in Academic Writing

In recent years, NMT tools have gained prominence in various fields, including academic writing, due to their ability to generate more accurate and contextually relevant translations (Tan et al., 2020; Zhang & Zong, 2020). Among these NMT tools, DeepL Translator has emerged as a prominent choice due to its superior performance in capturing nuanced meanings and context. It is evidenced by positive perceptions in a study by Polakova and Klimova (2023) reported by students in questionnaire surveys who found it beneficial for learning new vocabulary, understanding word meanings, receiving feedback, and enhancing language skills.

Integrating DeepL Translator into academic writing processes represented a paradigm shift in language support tools, as it offered advanced automated translation capabilities that could positively impact the quality of student essays and improve their evaluation by teachers (Birdsell, 2022). In terms of the quality of the translation, DeepL Translator, a machine translation system, was compared to Google Translate. DeepL Translator outperformed Google Translate in linguistic categories such as verb tense, aspect mood, composition, and function words, with an average performance of about four percentage points higher (Burchardt et al., 2021).

Despite the evident efficacy of integrating DeepL Translator in academic writing, it also raises some considerations. For instance, one concern is that it may hinder the writing or text mediation skills of plurilingual users, as their translated output may require significant improvement, and the machine translator engine should not replace the author's role (Klimkowski, 2023). DeepL Translator encountered difficulties in achieving precise translations of academic writing, specifically within the domain of medical texts. The DeepL Translator may struggle with grammar, syntax, and vocabulary between highly specialized and more widely accessible scientific language in medical contexts (Cambedda et al., 2021).

In addition, a recent study conducted by Sebo and De Lucia (2024) discovered that DeepL Translator, Google Translate, and CUBBITT demonstrated similar performance when assessed using Recall-Oriented Understudy for Gisting Evaluation (ROUGE) metrics for translating French medical research abstracts into English. This implies that French researchers could find it advantageous to utilize DeepL Translator to translate French articles into English. It is possible that this could enhance access to crucial medical studies for English-speaking individuals. Nevertheless, further studies are needed to determine the overall accuracy and reliability of the translation tools in different contexts.

Methodology

Research Design

The research methodology employed in this study related to the core of autoethnography, aligning with its fundamental principles of auto (self), ethno (culture), and graphy (research process) components (Chang, 2016; Ellis, 2020; Ellis & Bochner, 2000). To delve deeper into the considerations and dilemmas faced by multilingual learners due to the integration of Neural Machine Translation (NMT) in academic writing, we embraced collaborative autoethnography (CAE) as our qualitative method (Chang, 2013). In the context of this study, CAE allows for the participation of multiple authors who also serve as participants, fostering a collective exploration of their diverse perspectives. Wall (2006) posited that autoethnography provides a personalized platform for researchers to delve into their experiences, offering insights into societal phenomena. By curating and collectively analyzing autobiographical materials, we aimed to highlight the complexities surrounding the integration of NMT in academic writing, particularly within the context of multilingual learners.

Data Collection and Analysis

According to Chang (2016), autoethnography follows the conventional sequence of ethnographic research, which includes stages such as gathering, analyzing, interpreting data, and composing reports. Autoethnography referred to the data as 'field texts' (Clandinin & Connelly, 2000; as cited in Chang, 2007, p. 4). Field texts comprise experiential information obtained through the researcher/participant's subjective engagement (Wall, 2006, p. 155). In the initial phases of data collection, each researcher/participant embarked on using memory as a pivotal tool for collecting field texts, shaping narratives, and identifying key insights. These field texts were imbued with personal reflections, anecdotes, and observations, providing a rich tapestry of lived experiences with NMT in academic writing. As it was through memory that personal experiences were captured, they were examined with critical, analytical, and interpretive lenses (Chang, 2016), where the emotional balance between the subjective and objective aspects of one's persona was crucial, ensuring a holistic exploration of the self within cultural contexts (Jones, 2005, p. 764).

After compiling field texts into a unified document within MAXQDA, researchers prepared for thematic analysis in the selective open focus stage (Saldaña, 2021). During this phase, a collaborative effort ensued among researchers/participants to discern prevailing themes derived from their combined experiences. These discussions transcended surface-level exploration, delving into the underlying assumptions and ramifications of the identified subjects,

aiming to achieve a more profound scrutiny level. Altogether, participants meticulously scrutinized, deliberated, and classified noteworthy excerpts from their field texts, collectively refining thematic frameworks to encapsulate the core essence of their shared encounters. Through this iterative process, we gained a nuanced comprehension of the challenges and complexities inherent in integrating NMT within academic writing for multilingual learners. Finally, the culmination of this journey lay in report writing or auto-ethnographic writing, where participants crafted narratives infused with their own feelings and experiences, positioning themselves as significant social actors within their stories. This intricate process allowed for a nuanced understanding of personal narratives within broader societal constructs, revealing the complexities of human experiences and cultural identities.

Positioning and Profiles of Research Participants/Researchers

In this autoethnographic exploration, we delve into the intertwined experiences of two participants/researchers, siblings whose life paths have closely paralleled each other, navigating the intricate intersection of language, culture, and education. Born in Saudi Jeddah to a Yemeni father and an Indonesian mother, their upbringing within an Arabic-speaking environment fostered a strong foundation in their mother tongue. At the same time, Indonesian became a significant language due to their maternal heritage. Despite residing in an Arab environment, their Indonesian roots remain strong due to regular visits to Indonesia and interactions with their mother's family, enriching their linguistic repertoire. This multicultural upbringing shaped their identities and language proficiencies. As a result, they decided to pursue learning English in Indonesia and faced challenges in mastering English as a foreign language alongside Indonesian. It is impossible to avoid relying on NMT in their academic endeavors, especially in tasks requiring precise language, such as scientific article writing.

However, as multilingual learners, using NMT can be quite challenging because they have to deal with the complexities of translation accuracy and ensure academic integrity. Therefore, integrating NMT can be both a useful tool and a hurdle for them. In this collaborative autoethnographic endeavor, the participants/researchers conveyed their experiences as multilingual learners who have navigated the complexities of using NMT in academic settings. Based on their extensive experience, they provided valuable insights into the nuances of language translation and the cultural considerations that are intertwined with academic writing, providing a multifaceted exploration of the dilemmas encountered by multilingual learners.

Trustworthiness

To ensure the trustworthiness of this Collaborative Autoethnographic (CAE) study, we employed a multifaceted approach to establish validity and reliability, in line with the methodological principles of autoethnography. Firstly, the collaborative nature of this study, involving peer debriefing and dialogue among researchers/participants, further mitigates individual biases and enhances the reliability of the findings. Secondly, through iterative data collection and thematic analysis. Researchers engaged in ongoing reflection and discussion, analyzing and interpreting field texts in a way that ensured both depth and accuracy.

This iterative process, supported by the use of MAXQDA for data management, enabled a comprehensive examination of themes and patterns, which ensured the conclusions' reliability.

Finally, reflexivity was integral to this study, as participants regularly engaged in self-reflection and collective discussions about their positionalities and potential biases. This reflexive practice was documented and transparently integrated into the narrative, which enhanced the study's validity by acknowledging and addressing the researchers' subjective influences. Collectively, these strategies ensured that the findings of this study are robust, reliable, and reflective of a shared understanding of the challenges and complexities around the integration of NMT specifically DeepL Translator within their academic writing for multilingual learners.

Results and Discussion

The field texts and collaborative discussions with multilingual learners revealed significant insights regarding the complexities and challenges associated with incorporating DeepL, a form of NMT that can be used in the academic writing field. The exploration of this integration highlighted several noteworthy findings, particularly concerning ethical, educational, and linguistic considerations and dilemmas.

Ethical Considerations

The primary focus centers on ethical dilemmas encountered by multilingual learners when incorporating DeepL into their academic writing pursuits. The following encapsulates the reflections of participants/researchers on the nuanced negotiation of these complex dynamics inherent in the translation process.

First author/cultural sensitivity and appropriation: *When I transcribed excerpts from a textbook for subsequent analysis and incorporation, I translated these contents into Arabic and sometimes Indonesian. I faced challenges in accurately conveying the cultural nuances embedded in the original writings. For instance, when the term "alpha female" was translated into Arabic, it did not capture the meaning of this word. Which "female" appropriately denotes "أنثى," while the term "alpha" remained untranslatable, merely transcribed into Arabic letters as "ألفا." This omission overlooks the significance of the term within the original context. Besides, DeepL translation often neglects to capture the essence of meaning when translating poems or idioms, resulting in potential misinterpretations. For instance, when I translate the phrase "as two and a half elephants," DeepL translates it literally even though the point of this sentence is to show how heavy the thing being described is.*

The first author recounts instances where DeepL fails to capture the depth of cultural references embedded within their writing. This loss not only undermines the richness of their narrative but also raises ethical concerns regarding cultural misrepresentation. The first author's encounter with cultural sensitivity and appropriation underscores the intricate challenges involved in preserving the cultural nuances embedded within original texts, leading to potential misinterpretations. Moreover, the first author highlights the inadequacy of literal translations in conveying the intended meanings of idiomatic expressions and poems, thus emphasizing the importance of cultural understanding in translation processes. Delving into the results, the first author emphasizes the need for nuanced translation tools that respect cultural intricacies, advocating for the development of NMT models trained specifically to preserve cultural context.

Second author/gender bias and neutrality: *In my involvement with the process of using DeepL for academic text translation, I've encountered instances where gender bias and neutrality manifested in the translations, particularly when translating between Arabic and English or Indonesian, and vice versa. Arabic linguistic constructs often indicate gender, unlike the gender-neutral nature of English and Indonesian. Notably, terms such as "participants" in English and "peserta" in Indonesian, when translated to Arabic as "المشاركون," tend to be rendered with masculine pronouns, reflecting inherent biases within DeepL. Conversely, translations from Arabic, which employs explicit pronouns, into English and Indonesian, exhibit complete neutrality in rendering the term. Another illustrative example is the translation of "عالمة" in Arabic, denoting the female pronoun, to "scientist" in English and "ilmuwan" in Indonesian. These discrepancies in gender biases and neutralities may alter the original text's intended meaning.*

On the other hand, the second author's observation regarding gender bias and neutrality illuminates the subtleties across different languages and their impact on translation outcomes. The examples provided demonstrate how translations can inadvertently reinforce or alter the gendered nature of the original text, potentially leading to misrepresentation or distortion of the author's intended message. The discrepancy in gender representation between languages, especially evident in Arabic's explicit gender markers contrasted with English and Indonesian's gender-neutral constructs, underscores the complexity of maintaining linguistic accuracy and inclusivity in translated texts. This underscores the importance of critically examining the outputs of DeepL translation systems and the need for greater awareness of existing biases in NMT processes posed a significant ethical dilemma.

In this study, integrating NMT tools such as DeepL Translator into academic writing by multilingual learners has raised some ethical considerations that require careful examination. Based on the first author, one main concern is the potential for cultural insensitivity or appropriation when using NMT tools to convey ideas across languages and cultures. As NMT-generated text may not fully grasp the nuances of cultural contexts, it could risk that nuanced cultural meanings may be lost, perpetuated stereotypes, or misconstrued in translation, leading to unintentional offense or misrepresentation. This discovery aligns with a study conducted by ZAID and Bennoudi (2023), which revealed that although AI-powered translation tools have made progress, human skills are still needed to handle intricate religious sentences effectively. Human translators outperform machine translations in conveying complex concepts with cultural sensitivity and maintaining the language and cultural nuances.

Therefore, researchers must be cautious when using these NMT tools to ensure that the translated text does not inadvertently offend or disrespect the cultural norms of the target audience. In addition, the second author emphasizes the importance of addressing potential gender bias or neutrality in the output of NMT tools, especially regarding ethical considerations. This aligns with previous studies that have highlighted how some NMT tool algorithms may perpetuate gender stereotypes or exhibit a preference for masculine-coded language (Connor & Liu, 2023; Monti, 2020; Stanovsky et al., 2019; Vanmassenhove, 2024). By carefully considering these ethical implications, researchers can ensure that using DeepL Translator and similar tools in academic writing remains ethical and inclusive.

Educational Considerations

The educational dimension emerged as another significant theme amidst various challenges and choices encountered by multilingual learners when integrating DeepL translation into their academic writing practices. In this context, the participants/researchers highlight the educational facets derived from their experiences.

First author/learning dependency: *I am acutely aware of the invaluable assistance provided by DeepL Translator in streamlining the translation process. However, I realized that I had become overly reliant on its usage. Even for straightforward sentences, I find myself turning to this translator out of habit, which has resulted in a decline in my language acquisition and comprehension skills. This over-reliance also reinforced feelings of self-doubt and an obsession with the fear of making mistakes.*

Second author/balancing assistance and autonomy: *I often find it challenging to keep up with the fast-paced technological advancements of our time. Tools like DeepL have transformed the translation landscape almost overnight, making the process faster and more convenient. However, amidst this convenience and allure of instant results, I have noticed a gradual erosion of my linguistic autonomy and critical thinking abilities. It seems as if the ease of access and omnipresence of such tools have pushed me towards a state of overreliance, blurring the line between leveraging them as aids and becoming entirely dependent on them. The ease with which translations can be generated at the click of a button has sometimes overshadowed the value of independent thought and analysis, leaving me pondering the broader implications of this phenomenon on my intellectual growth.*

The participants/researchers recognize the undeniable utility and effectiveness provided by DeepL Translator in expediting the translation process. However, this convenience is not devoid of drawbacks, both writers express reservations regarding their excessive dependence on such tools. It becomes apparent that incorporating DeepL Translator into academic writing practices presents a dilemma. One author points out a decline in language acquisition and comprehension skills stemming from excessive reliance on DeepL, resulting in feelings of self-doubt and apprehension about making errors. Similarly, the other author considers the diminishing of linguistic independence and critical thinking capacities, raising concerns about the broader implications of this trend on intellectual development. Striving for a balanced relationship between technological aid and personal autonomy emerges as a crucial aspect for multilingual learners in the digital era, necessitating caution against the potential drawbacks of relying too heavily on such tools and a actively seeking opportunities for independent skill development.

Second author/feedback and revision: *When I present my written work to supervisors, I frequently encounter marginal notes highlighting shortcomings in sentence structure or translation accuracy. Although the ongoing advancements in tools like DeepL Translator and other NMT tools aid in language refinement, the iterative cycle of feedback and revision remains indispensable for me to enhance the quality of my writing. This collaborative process allows me to correct mistakes and fosters continual improvement, ensuring that my work meets the required standards and effectively communicates my intended message.*

Moreover, the second author's emphasis on the iterative cycle of feedback and revision highlights the enduring significance of human intervention in the academic writing process.

Feedback motivates iterative improvement, offering insights into linguistic nuances, stylistic conventions, and content coherence. Despite the advancements in machine translation technology, human oversight remains indispensable in refining language proficiency and ensuring the quality of written work. This emphasizes the complementary relationship between technological tools and human expertise, each contributing distinct strengths to the educational endeavor.

The individuals in this study emphasized the intricate difficulties and decisions faced as they navigated the benefits and drawbacks of incorporating such advanced translation technology into their work. The first author notes an acute awareness of the invaluable assistance provided by DeepL Translator in simplifying the translation process. However, this over-reliance on NMT tools for translation tasks can lead to a decline in language skills, reinforcing self-doubt and fear of errors, ultimately affecting language acquisition and comprehension. It aligns with a study by Salinas and Burbat (2023), which highlighted the limitations and mistakes made by students when using NMT tools like DeepL. Students showed grammar errors in syntax, declension, prepositions, and tenses, indicating a reliance on these tools without effectively addressing linguistic aspects.

The second author expresses concerns about the gradual erosion of linguistic autonomy and critical thinking abilities, as the ease and convenience of NMT tools have overshadowed the value of independent thought and analysis. This is consistent with Briggs's study (2018), which emphasized the need for pedagogical emphasis on developing students' productive and analytic skills in English, and highlighted the importance of addressing the potential erosion of critical thinking abilities resulting from the use of WBMT tools. Furthermore, integrating NMT tools into academic practices should include efforts to develop independent language skills and human-mediated feedback, as Ragni and Vieira (2022) found that although NMT can produce fluent output, it still requires human expertise for error correction, underscoring the ongoing significance of human participation in the translation process.

Linguistic Considerations

Investigating the nuanced intricacies involved in integrating the DeepL translation tool within the academic writing practices of multilingual learners led to the emergence of a distinct theme centered around the profound linguistic considerations shaping their experiences. This investigation unveiled a multifaceted terrain where language proficiency, nuances, and technological adaptation intersect, influencing the trajectory of these learners' educational endeavors.

First author/ambiguity and polysemy: *One recurring challenge I face arises from the ambiguity of certain terms, which often I struggle to disambiguate accurately. For instance, when translating the term "bank" from English to Arabic or Indonesian, the meaning shifts depending on the context: it could refer to a financial institution or the edge of a river. However, DeepL's translation lacks context sensitivity, leading to potential misinterpretations. Similarly, polysemic words present another layer of complexity. Take, for instance, the word "run" in English, which could denote physical activity, management, or operation. When translating such polysemic words, DeepL's algorithm tends to opt for the most common usage, overlooking the contextual nuances present in the original text.*

The reflection of the first author on the difficulties presented by vague terms and words with multiple meanings highlights the complexities involved in translation endeavors. This highlights a fundamental challenge faced by machine translation algorithms, which often prioritize literal renditions over grasping contextual nuances. Consequently, individuals proficient in multiple languages must navigate a landscape where the risk of misinterpretation is significant, necessitating a comprehensive grasp of language that extends beyond straightforward lexical translations. From an analytical standpoint, it is crucial to acknowledge the limitations inherent in machine translation systems like DeepL. While these tools undeniably streamline the translation process, their reliance on statistical models and algorithms inherently restricts their capacity to capture the richness and intricacies of human language. Therefore, those proficient in multiple languages must approach NMT tools with discernment, complementing their outputs with critical analysis and a deep understanding of context.

Second author/local language variations: *As someone who navigates between Arabic as a first language and Indonesian as a second, I am intimately acquainted with the variances within each language stemming from diverse regions and societal norms. I find myself seamlessly integrating with various dialects and colloquial expressions, even if this linguistic diversity in academic writings is rare. It's a rich tapestry of linguistic diversity that I encounter regularly, contrasting sharply with the standardized approach favored by DeepL translation algorithms. These algorithms, while efficient, tend to homogenize language, disregarding the nuances and intricacies inherent in local variations.*

The reflection from the second author sheds light on the intricate linguistic terrain they traverse, highlighting a striking disparity between their diverse linguistic repertoire and the standardized framework employed by DeepL translation algorithms. Their skillful incorporation of various dialects and colloquialisms in Arabic and Indonesian demonstrates a profound grasp of linguistic subtleties that extend beyond conventional boundaries. However, this richness starkly contrasts with the homogenizing nature of machine translation, which prioritizes consistency at the expense of cultural vibrancy. In essence, the author's reflection emphasizes the indispensable nature of human involvement in translation processes, particularly in navigating the complexities of language and culture. It underscores the need for a nuanced approach that acknowledges and preserves the richness and diversity of languages in all their forms.

Ambiguity and polysemy arise in NMT tools when a word or phrase has multiple interpretations, leading to misunderstandings and misinterpretations in academic texts. This aligns with a study that revealed that while NMT tools have improved significantly, they still face challenges, such as morphological errors and term omissions, indicating the ability to handle complex linguistic structures and context-sensitive meanings is still limited (Haque et al., 2020). Another study by Liu and Zhu (2023) recognized the importance of enhancing context-based disambiguation in NMT systems by developing the 'NMT Lexicon Intelligent Translation Assistant' based on the 'Cue Lexicon' model to ensure more accurate and contextually appropriate translations.

This issue emphasizes the need for multilingual learners to deeply understand both the source and target languages to detect and correct such discrepancies, thereby ensuring the accuracy and clarity of their academic writing. Local language variations present another layer

of complexity when using NMT tools for academic writing. Different dialects and regional expressions can pose significant challenges for NMT systems, which may not always be trained on diverse linguistic data (Baniata et al., 2018). The diverse linguistic characteristics and unique features of the Tunisian Dialect (TD) are standardized when translated into Modern Standard Arabic (MSA) by using NMT models (Emna et al., 2022). However, this standardization process leads to the loss of regional linguistic differences that are important for capturing the cultural richness and authenticity of the Tunisian dialect. This highlights the importance of in-depth cultural and linguistic awareness alongside technical proficiency in NMT tools.

Conclusion

This study explored the considerations and dilemmas for multilingual learners when integrating Neural Machine Translation (NMT) into their academic writing. Employing collaborative autoethnography (CAE) as the method, the research delved into the experiences of two participants/researchers—siblings, with roots in Yemeni and Indonesian cultures, who detailed their unique linguistic journey, focusing on their reliance on NMT tools, specifically DeepL Translator, in their academic endeavors. The study revealed key themes, including ethical considerations, such as cultural sensitivity and gender bias; educational considerations, containing learning dependency, balancing assistance with autonomy, and the importance of feedback and revision; and linguistic considerations, involving ambiguity and local language variations.

The strength of this study lies in its in-depth and personalized insight that highlights the real-world implications of using NMT tools in academic settings. However, the current study was limited to DeepL Translator as one of the NMT tools used. Future researchers are advised to consider a wider range of participants from diverse cultural backgrounds to obtain more generalizable results, explore a variety of NMT tools, and investigate the long-term impact of using NMT in academic settings. Additionally, incorporating quantitative methods could complement the qualitative insights and provide a more comprehensive understanding of the implications of NMT in academic writing.

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Bio

Salma Ali Salem Mansoor was born on May 31st, 1997 in Jeddah, Saudi Arabia. She graduated with a bachelor's degree in 2023 from the English Education Department at the Faculty of Teacher Training and Education at the Islamic University of Jember, Jember, Indonesia. She is currently a highly experienced teacher, particularly in English language and literacy education for middle and high school students in Indonesia. Her academic journey reflects a commitment to enhancing English language education, particularly in diverse cultural contexts, equipping her to contribute effectively to the field of education. Her dedication to fostering inclusive and

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References

Baniata, L. H., Park, S., & Park, S. (2018). A neural machine translation model for Arabic dialects that utilizes multitask earning (MTL). *Computational Intelligence and Neuroscience*, *2018*. https://doi.org/10.1155/2018/7534712

Briggs, N. (2018). Neural machine translation tools in the language learning classroom: Students' use , perceptions , and analyses. *Jalt Call Journal*, *14*(1), 3–24. https://doi.org/10.29140/jaltcall.v14n1.221

Burchardt, A., Lommel, A., & Macketanz, V. (2021). A new deal for translation quality. *Universal Access in the Information Society*, *20*(4), 701–715. https://doi.org/10.1007/s10209-020-00736-5

Cambedda, G., Di Nunzio, G. M., & Nosilia, V. (2021). A study on machine translation tools: A comparative error analysis between DeepL and Yandex for Russian-Italian medical translation. *Umanistica Digitale*, *10*(1), 139–163. https://doi.org/10.6092/issn.2532-8816/12631

Chang, H. (2013). Individual and collaborative autoethnography as method. In S. Holman Jones, T. E. Adams, & C. Ellis (Eds.), *Handbook of autoethnography* (pp. 107–119). Walnut Creek, CA: West Coast Press.

Chang, H. (2016). *Autoethnography as a method*. Routledge. https://doi.org/10.4324/9781315433370

Chen, Y., & Eisele, A. (2010). Integrating a rule-based with a hierarchical translation system. *Proceedings of the 7th International Conference on Language Resources and Evaluation, LREC 2010*, 1746–1752.

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), 2239–2264. https://doi.org/10.1080/09588221.2020.1871029

Clandinin, D. J., & Connelly, F. M. (2000). *Narrative inquiry: Experience and story in qualitative research*. CA: Jossey-Bass.

Connor, S. O., & Liu, H. (2023). Gender bias perpetuation and mitigation in AI technologies :

challenges and opportunities. *AI & SOCIETY*, 1–13. https://doi.org/10.1007/s00146-023-01675-4

Donaj, G., & Kačič, Z. (2017). Context-dependent factored language models. *Eurasip Journal on Audio, Speech, and Music Processing*, *2017*(1). https://doi.org/10.1186/s13636-017-0104-6

Dusza, D. G. (2023). Machine translation in the writing process: Pedagogy, plagiarism, Policy, and procedures. In *S. E. Eaton (ed.), Handbook of Academic Integrity*. Springer Nature Switzerland. https://doi.org/10.1007/978-981-287-098-8

Ellis, C. (2020). *Revision: Autoethnographic reflections on life and work* (1st ed). Routledge. https://doi.org/10.4324/9780429259661

Ellis, C., & Bochner, A. P. (2000). *Autoethnography, personal narrative, and personal reflexivity. In N. K. Denzin & Y. S. Lincoln (Eds.), Handbook of qualitative research (2nd ed., pp. 733–768).* Thousand Oaks, CA: Sage.

Emna, A., Kchaou, S., & Boujelban, R. (2022). Neural machine translation of low resource languages: Application to transcriptions of Tunisian dialect. In: Bennour, A., Ensari, T., Kessentini, Y., Eom, S. (eds) Intelligent systems and pattern recognition. ISPR 2022. *Communications in Computer and Information Science, 1589*, 234–247. https://doi.org/10.1007/978-3-031-08277-1_20

Haque, R., Hasanuzzaman, M., & Way, A. (2020). Analysing terminology translation errors in statistical and neural machine translation. *Machine Translation*, *34*, 149–195. https://doi.org/10.1007/s10590-020-09251-z

He, Z., Meng, Y., & Yu, H. (2010). Learning phrase boundaries for hierarchical phrase-based translation. *Coling 2010 - 23rd International Conference on Computational Linguistics, Proceedings of the Conference*, *2*(August), 383–390.

Hearne, M., & Way, A. (2011). Statistical machine translation : A guide for linguists and translators. *Language and Linguistics Compass*, *5*(5), 205–226. https://doi.org/10.1111/j.1749-818x.2011.00274.x

Holman Jones, S. (2005). Autoethnography: Making personal political. In *The Sage handbook of qualitative research,* edited by N.K. Denzin and Y.S. Lincoln. Thousand Oaks, CA: Sage.

House, J. (2020). Translation as a prime player in intercultural communication. *Applied Linguistics*, *41*(1), 10–29. https://doi.org/10.1093/applin/amz007

Hutchins, J. (2005). Example-based machine translation: A review and commentary. *Machine Translation*, *19*(3–4), 197–211. https://doi.org/10.1007/s10590-006-9003-9

Hutchins, W. J. (1995). Machine translation: A brief history. In E. F. K. Koerner & R. E. Asher (Eds.). In *Concise history of the language sciences: From the Sumerians to the cognitivists*. Pergamon Press. https://doi.org/10.1016/b978-0-08-042580-1.50066-0

Hutchins, W. J. (2001). Machine Translation over fifty years. *Histoire Épistémologie Langage*, *23*(1), 7–31. https://doi.org/10.3406/hel.2001.2815

J. Birdsell, B. (2022). Student writings with DeepL: Teacher evaluations and implications for teaching. *Reflections and New Perspectives*, *2021*(1), 117–123. https://doi.org/10.37546/jaltpcp2021-14

Kafle, M. (2020). “No one would like to take a risk”: Multilingual students’ views on language mixing in academic writing. *System*, *94*. https://doi.org/10.1016/j.system.2020.102326

Kenny, D. (2022). Human and machine translation. In Dorothy Kenny (ed.), *Machine translation foreveryone: Empowering users in the age ofartificial intelligence*. Berlin: Language Science Press. https://doi.org/10 . 5281 / zenodo . 6759976

Klimkowski, K. (2023). DeepL translate and DeepL write as tools for text mediation in plurilingual workplaces. *Academic Journal of Modern Philology*, *19*, 163–175. https://doi.org/10.34616/ajmp.2023.19.11

Langum, V., & Sullivan, K. P. H. (2020). Academic writing, scholarly identity, voice and the benefits and challenges of multilingualism: Reflections from Norwegian doctoral researchers in teacher education. *Linguistics and Education*, *60*, 100883. https://doi.org/10.1016/j.linged.2020.100883

Li, M., Zhou, C., & Henriksen, L. B. (2020). A socio-technical-cultural system perspective to rethinking translation technology in intercultural communication. *Communication & Language at Work*, *7*(1), 100–110. https://doi.org/10.7146/claw.v7i1.123259

Liu, S., & Zhu, W. (2023). An analysis of the evaluation of the translation quality of neural Machine Translation Application Systems. *Applied Artificial Intelligence*, *37*(1). https://doi.org/10.1080/08839514.2023.2214460

Ma, L. P. F. (2021). Writing in English as an additional language: challenges encountered by doctoral students. *Higher Education Research and Development*, *40*(6), 1176–1190. https://doi.org/10.1080/07294360.2020.1809354

Marshall, S., & Marr, J. W. (2018). Teaching multilingual learners in Canadian writing-intensive classrooms: Pedagogy, binaries, and conflicting identities. *Journal of Second Language Writing*, *40*, 32–43. https://doi.org/10.1016/j.jslw.2018.01.002

Maruf, S., Saleh, F., & Haffari, G. (2021). A survey on document-level neural machine translation: Methods and evaluation. *ACM Computing Surveys*, *54*(2), 1–36. https://doi.org/10.1145/3441691

Mohamed, S. A., Elsayed, A. A., Hassan, Y. F., & Abdou, M. A. (2021). Neural machine translation: past, present, and future. *Neural Computing and Applications*, *33*(23), 15919–15931. https://doi.org/10.1007/s00521-021-06268-0

Monti, J. (2020). Gender issues in machine translation an unsolved problem?. In *The Routledge Handbook of Translation, Feminism and Gender*. Routledge. https://doi.org/10.4324/9781315158938

Moqadem, A. Ben, & Koumachi, B. (2023). Translation in language learning and teaching: From a sub Rosa practice into a bedrock of global education policy. *European Journal of Foreign Language Teaching*, *7*(2), 133–150. https://doi.org/10.46827/ejfl.v7i2.5001

Morton, J., Storch, N., & Thompson, C. (2015). What our students tell us: Perceptions of three multilingual students on their academic writing in first year. *Journal of Second Language Writing*, *30*, 1–13. https://doi.org/10.1016/j.jslw.2015.06.007

Nagodawithana, K. A. (2020). Culture in translation: A comprehensive study. *Journal of Social Sciences and Humanities Review (JSSHR)*, *5*(4), 210–224. https://doi.org/10.4038/jsshr.v5i4.68

Okpor, M. D. (2014). Machine translation approaches: Issues and challenges. *IJCSI International Journal of Computer Science Issues*, *11*(5), 1694–0784.

Olteanu, A. (2020). Translation from a contemporary media perspective: Avoiding culturalism and monolingualism. *Social Semiotics*, *32*(1), 143–161. https://doi.org/10.1080/10350330.2020.1714204

Pathak, A., & Pakray, P. (2019). Neural machine translation for Indian languages. *Journal of Intelligent Systems*, *28*(3), 465–477. https://doi.org/10.1515/jisys-2018-0065

Pessoa, S., Miller, R. T., & Kaufer, D. (2014). Students' challenges and development in the transition to academic writing at an English-medium university in Qatar. *IRAL - International Review of Applied Linguistics in Language Teaching*, *52*(2), 127–156. https://doi.org/10.1515/iral-2014-0006

Polakova, P., & Klimova, B. (2023). Using DeepL translator in learning English as an applied foreign language – An empirical pilot study. *Heliyon*, *9*(8), e18595. https://doi.org/10.1016/j.heliyon.2023.e18595

Ragni, V., & Vieira, L. N. (2022). What has changed with neural machine translation? A critical review of human factors. *Perspectives*, *30*(1), 137–158. https://doi.org/10.1080/0907676X.2021.1889005

Saldaña, J. (2021). *The coding manual for qualitative researchers (4th ed.)*. Sage Publications.

Salinas, M. J. V., & Burbat, R. (2023). Google translate and DeepL: Breaking taboos in translator training. Observational study and analysis. *Iberica*, *45*, 243–266. https://doi.org/10.17398/2340-2784.45.243

Sebo, P., & De Lucia, S. (2024). Performance of machine translators in translating French medical research abstracts to English: A comparative study of DeepL, Google Translate, and CUBBITT. *PLoS ONE*, *19*(2), 1–13. https://doi.org/10.1371/journal.pone.0297183

Shala, A. (2019). Translating culture: Mediating customary law related language. *Auc Philologica*, *2019*(4), 93–106. https://doi.org/10.14712/24646830.2020.8

Stahlberg, F. (2020). Neural machine translation: A review. *Journal of Artificial Intelligence Research*, *69*, 343–418. https://doi.org/10.1613/JAIR.1.12007

Stanovsky, G., Smith, N. A., & Zettlemoyer, L. (2019). Evaluating gender bias in machine translation. *ArXiv Preprint ArXiv:1906.00591*. https://doi.org/10.48550/arXiv.1906.00591

Steigerwald, E., Ramírez-Castañeda, V., Brandt, D. Y. C., Báldi, A., Shapiro, J. T., Bowker,

L., & Tarvin, R. D. (2022). Overcoming language barriers in Academia: Machine translation tools and a vision for a multilingual future. *BioScience*, *72*(10), 988–998. https://doi.org/10.1093/biosci/biac062

Tan, Z., Wang, S., Yang, Z., Chen, G., Huang, X., Sun, M., & Liu, Y. (2020). Neural machine translation: A review of methods, resources, and tools. *AI Open*, *1*(October 2020), 5–21. https://doi.org/10.1016/j.aiopen.2020.11.001

Turcato, D., & Popowich, F. (2003). What is example-based machine translation?. In Carl, M., Way, A. (eds) Recent advances in example-based machine translation. In *Text, speech and language technology* (Vol. 21). Springer, Dordrecht. https://doi.org/10.1007/978-94-010-0181-6_2

Vanmassenhove, E. (2024). Gender bias in machine translation and the era of large language models. *ArXiv Preprint ArXiv:2401.10016*, 1–24. https://doi.org/10.48550/arXiv.2401.10016

Wall, S. (2006). An autoethnography on learning about autoethnography. *International Journal of Qualitative Methods*, *5*(2), 146–160. https://doi.org/10.1177/160940690600500205

Wang, H., Wu, H., He, Z., Huang, L., & Church, K. W. (2022). Progress in machine translation. *Engineering*, *18*, 143–153. https://doi.org/10.1016/j.eng.2021.03.023

Wang, J. (2022). Research on cultural translation based on neural network. *Mathematical Problems in Engineering*, *2022*, 1–9. https://doi.org/10.1155/2022/6330814

Weng, R., Wang, Q., Cheng, W., Zhu, C., & Zhang, M. (2023). Towards reliable neural machine translation with consistency-aware meta-learning. *Proceedings of the 37th AAAI Conference on Artificial Intelligence, AAAI 2023*, *37*, 13709–13717. https://doi.org/10.1609/aaai.v37i11.26606

Wight, S. (2017). Admitted or denied: Multilingual writers negotiate admissions essays. *Journal of Adolescent and Adult Literacy*, *61*(2), 141–151. https://doi.org/10.1002/jaal.667

ZAID, A., & Bennoudi, H. (2023). AI vs. human translators: Navigating the complex world of religious texts and cultural sensitivity. *International Journal of Linguistics, Literature and Translation (IJLLT)*, *6*(11), 173–182. https://doi.org/10.32996/ijllt.2023.6.11.21

Zens, R., Och, F. J., & Ney, H. (2002). Phrase-based statistical machine translation. In *Jarke, M., Lakemeyer, G., Koehler, J. In KI 2002: Advances in artificial intelligence: 25th Annual German Conference on AI, KI 2002, Aachen, Germany, September 16-20, 2002. Proceedings*. 18–32. https://doi.org/10.1007/3-540-45751-8_2

Zhang, J. J., & Zong, C. Q. (2020). Neural machine translation: Challenges, progress and future. *Science China Technological Sciences*, *63*(10), 2028–2050. https://doi.org/10.1007/s11431-020-1632-x