The Benefits and Challenges of AI Translation Tools in Translation Education at the Tertiary Level: A Systematic Review

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ABSTRACT

The growth of AI-powered technologies has highlighted transformative impacts. This study presents a systematic review of the benefits and challenges of AI translation tools in tertiary-level translation education. It aims to identify how they support and hinder students and teachers. The data were extracted from 20 peer-reviewed articles (2014-2024) on six academic databases, using standardization and thematic synthesis based on the PRISMA guidelines. The qualitative findings revealed eight core benefits: enhanced translation efficiency, improved vocabulary and grammar, post-editing support, increased learner motivation, professional and technical preparedness, accessibility and inclusion, reflective learning and personalization, and teacher support and pedagogical innovation; and seven key challenges: overreliance on AI, contextual inaccuracies, digital inequity, insufficient training and pedagogical gaps, ethical and privacy concerns, usability issues for senior lecturers, and lack of institutional support and curriculum integration. Valuable insights and recommendations were then offered to refine translation pedagogy with effective AI tool integration.

Keywords: AI translation tools, benefits, challenges, translation education, tertiary level

Introduction

The 21st century has seen remarkable technological advancements. Thus, manual translation alone is insufficient for the demands of the field, necessitating the integration of artificial intelligence (AI) translation tools to streamline processes and enhance translation quality. AI-powered translation technologies have had a significant impact on the industry, extending their influence beyond professional practice to education (Koka, 2024). Digital technologies have

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transformed daily life, affecting how individuals seek information, communicate, and learn in education (Chassignol et al., 2018). Thus, translation education is no exception.

Computer-assisted translation (CAT) tools are important in improving the translation process and quality, which is helpful in training competent translators (Omar et al., 2020). Currently, in this AI-driven time, teachers should be reliable guides for their students in addition to their traditional role of language instructors (Phuong, 2024). Essentially, the role of AI translation tools in designing curricula needs to be highlighted in the combination of human translation skills with AI-assisted tasks. Thus, students are required to enhance both linguistic competence and technological competence (Tavares et al., 2023). Once the translation industry incorporates AI and CAT tools as a must, university programs should provide their students with an effective use of AI in their translation practice and promote their critical thinking and ethical standards (Hazaea & Qassem, 2024). The gap between the academic translation environment and the professional one will be narrowed with an understanding of the AI role (Tian, 2024).

As a result, a critical comparison and analysis of the relevant existing studies will provide useful and evidence-based insights. Thus, this study is a systematic review of the benefits and challenges of the use of AI translation tools in tertiary-level translation education. Its aim is to examine their support for translation training and identify difficulties faced by both students and teachers. The results provide students, teachers, and translation program developers with insights to refine translation curricula and technology integration strategies, offering implications for translation pedagogy and student learning outcomes.

Literature Review

Current Trends of Using AI Translation Tools in Translation Education

Alharbi (2023) demonstrates that new AI technology has helped overcome language and cultural barriers through rapid translations. Therefore, many high-technology inventions and AI advancements have become integral to our lives, assisting us in numerous ways, especially in the translation industry. AI tools, such as chatbots and automated assistants, support the translation process by facilitating language processes and promoting diverse cultural communication. Recognizing that AI translation tools have indirectly aided the translation industry, Bates et al. (2023) highlight the vital role of AI, specifically in bridging training gaps in academic settings.

AI technology has transformed translation education by streamlining the learning process through the integration of AI translation tools, providing real-time assistance for both teachers and students. These tools not only promote language acquisition but also provide professional training (Alharbi, 2023). The increasing demands of technology for translation practice mean that learners' familiarity with these tools helps them be better prepared for the job market. Besides providing technical support accompanied by real-time feedback, detecting errors, and suggesting phrases, the tools help them understand language in numerous settings, thereby enhancing their translation quality (Al-Rumaih, 2021; Bakhov et al., 2024; Deng & Yu, 2022; Han, 2020; Liu & Afzaal, 2021; Koka, 2024; Odacıoğlu & Kokturk, 2015; Omar & Salih, 2024; Tavares et al., 2023; Zhang, 2023).

Therefore, AI technology has become part of translation education. It helps break language and cultural barriers with time-saving and productive tools. As research shows, AI translation tools are useful aids to speed up translation and good preparation for students to meet the industry's requirements, though there exist some hindrances. The exploration and implementation of AI technology in translation education at the tertiary level are encouraged.

Research Questions

To achieve the research's aim and objectives, this systematic review is conducted to address the two research questions as follows:

1. What benefits do students and teachers get from using AI translation tools?
2. What challenges do students and teachers face in using AI translation tools?

Methods

Design of the Study

The study employs a systematic review methodology. It involves a structured process of identifying, selecting, and critically assessing relevant studies, followed by a thematic synthesis of the findings (Petticrew & Roberts, 2006). In this review, specific inclusion and exclusion criteria were applied to screen 20 empirical studies on the use of AI in translation education. This research design is useful for synthesizing various findings from such interdisciplinary fields as education, linguistics, and technology (Petticrew & Roberts, 2006). It is also an appropriate method to ensure a structured, transparent, and replicable process for identifying, evaluating, and summarizing relevant studies (Tavares et al., 2023); and to adapt to the varied reception in classroom environments (Booth et al., 2016; Gough et al., 2017). Thus, in the case of using AI translation tools in various university contexts, this design is applicable. This review follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Page et al., 2021) to set up well-defined inclusion and exclusion criteria and systematic database search strategies.

Pedagogical Setting & Sampling

We selected twenty studies from peer-reviewed journals published in the 2014-2024 period. Data extraction was performed using a standardized form and analyzed through thematic synthesis. Following PRISMA guidelines enhances the reliability, reproducibility, and academic integrity of the review (Moher et al., 2009). In detail, these studies were from the six academic databases, namely Google Scholar, Scopus, Web of Science, ResearchGate, LinguistList, and ERIC, which cover interdisciplinary research, particularly in artificial intelligence, education technology, and translation studies. We combined keywords and Boolean operators for data search. That means we used simple words (AND and OR) to refine searches for more accurate and efficient information. The search string below was used: *(AI-driven translation OR machine translation OR AI-assisted translation) AND (tertiary education OR university education OR higher education) AND (benefits OR challenges OR limitations) AND (translation practice OR translation learning OR translation education).*

To maintain PRISMA guidelines and relevance, specific inclusion and exclusion criteria were established to ensure that updated and contextually relevant studies were included in this systematic review.

Table 1

Criteria for sample selection

Criteria	Inclusion	Exclusion
Study type	Peer-reviewed journal articles, systematic reviews, and empirical studies	Editorials, blogs, opinions
Publication date	Last ten years (2014 - 2024)	Older studies, unless highly relevant
Language	English (or relevant translations)	Non-English without available translation
Participants	translation students and teachers	Professional translators, high school students

This output provided a total of 95 records. After removing 30 duplicates, 65 records remained for title and abstract screening. Six research members were involved in this data search procedure. Two independent reviewer groups (i.e., each has two members) screened all records based on predefined inclusion and exclusion criteria, which considered the study's relevance to AI-driven translation tools in tertiary settings, empirical methodology, and language of publication (English only). After screening and full-text analysis, 20 studies met all inclusion criteria and were included in the final synthesis. Disagreements between the reviewers during the screening or inclusion stages were resolved through discussion. When necessary, a third reviewer group (i.e., the final two members) mediated to reach consensus.

These 20 studies were selected based on their relevance to AI-assisted translation within tertiary education. Papers that focused on the use of AI translation tools in tertiary-level translation training were prioritized. Those in professional or industry contexts were excluded unless they offered pedagogical insights pertinent to academic learning environments. A summary of the studies for the systematic review is presented in Table 2.

Table 2

List of studies for the systematic review

1. Al-Rumaih (2021)	8. Koka (2024)	15. Omar et al. (2020)
2. Bakhov et al. (2024)	9. Laksana and Komara (2024)	16. Roza and Zulhirawati (2023)
3. Bao and Thi (2021)	10. Le and Dao (2019)	
4. Bouguesmia (2020)	11. Li et al. (2024)	17. Soysal (2023)
5. Deng and Yu (2022)	12. Liu and Afzaal (2021)	18. Tavares et al. (2023)
6. Han (2020)	13. Odacıoğlu and Kokturk (2015)	19. Yanti and Meka (2019)
7. Kenny and Doherty (2014)	14. Omar and Salih (2024)	20. Zhang (2023)

Data Collection and Analysis

To address the two research questions, we developed a data extraction framework for consistency and depth in analyzing the selected studies. A list of comprehensive data extraction was utilized to capture essential study details, including the title, authors, year of publication,

research type (qualitative, quantitative, mixed-methods, or review), AI translation tools examined (e.g., Google Translate, DeepL, ChatGPT, SDL Trados, etc.), key benefits and challenges identified, and conclusions relevant to tertiary-level education. This framework enabled us to systematically organize and compare findings across diverse studies, ensuring that both contextual and methodological variables were considered during the analysis.

For data interpretation, we applied a thematic synthesis approach. This qualitative method enabled the identification and comparison of recurring themes related to the two core research questions: the benefits of AI translation tools and the challenges faced by students and/or teachers. In detail, themes stemmed inductively. Data from the selected studies were coded based on their functional role in translation education. Themes were categorized into two main clusters: (1) *benefits* (e.g., efficiency and speed increase, vocabulary and grammar enhancement), (2) *challenges* (e.g., overreliance, accuracy limitations). Due to methodological heterogeneity across studies, a full meta-analysis was not feasible. As a result, narrative synthesis was prioritized to provide a comprehensive, context-rich understanding of the current academic landscape. The summary of the findings can be found in this link: https://drive.google.com/file/d/14rCIZj5dBkavtTi_l4EpkiIgMiMkiIkD/view?usp=drive_link.

The extracted data, including study aims, participants, and reported benefits and challenges of AI translation tools, were organized and managed using Microsoft Excel. Two research groups (each has two members) independently conducted an inductive thematic analysis following Braun and Clarke's (2006) framework. Initial coding was performed separately, and the resulting codes were compared and discussed to develop a shared codebook. Disagreements in coding were resolved through discussion, with a third research group (also consisting of two members) mediating unresolved cases to ensure inter-coder reliability. Final themes were refined through iterative review and validation to ensure consistency and accuracy across the dataset. This collaborative and transparent process helped ensure the reliability and validity of the identified themes.

Results

The Benefits of AI Translation Tools in Tertiary-Level Translation Education

Eight major benefits are identified from the use of AI tools in tertiary-level translation education, as presented in Table 3, including: student efficiency and speed increase (found in 9/20 studies), vocabulary and grammar enhancement (7/20), drafting and post-editing support (5/20), motivation and confidence boost (5/20), professional and technical preparedness (5/20), accessibility and inclusion (6/20), reflective learning and personalization (4/20), and teacher support and pedagogical innovation (3/20). Some common AI tools, such as Google Translate, DeepL, and SDL Trados, have been shown to improve students' translation quality in terms of lexical, syntactic, and semantic aspects. They also enhance students' reflective translation practices through iterative editing, prepare students' professional and technical competencies, and encourage teachers' pedagogical innovations.

Table 3

The benefits of AI translation tools in translation education

Ord.	Benefit	Description	Supporting studies
1	Efficiency and speed increase	AI tools accelerate translation tasks, especially for technical or repetitive content.	Odacıoğlu and Kokturk (2015), Han (2020), Bouguesmia (2020), Liu and Afzaal (2021), Al-Rumaih (2021), Deng and Yu (2022), Tavares et al. (2023), Zhang (2023), Koka (2024), Bakhov et al. (2024) ***(9 studies)***
2	Vocabulary and grammar enhancement	Tools like DeepL, Google Translate, and ChatGPT expose students to new vocabulary, synonyms, and grammar structures.	Yanti and Meka (2019), Le and Dao (2019), Bao and Thi (2021), Deng and Yu (2022), Zhang (2023), Roza and Zulhirawati (2023), Laksana and Komara (2024) ***(7 studies)***
3	Drafting and post-editing support	AI-generated drafts allow learners to revise and reflect, improving translation competence.	Bao and Thi (2021), Tavares et al. (2023), Zhang (2023), Omar and Salih (2024), Bakhov et al. (2024) ***(5 studies)***
4	Motivation and confidence boost	AI tools promote student engagement and increase confidence in translation tasks.	Omar et al. (2020), Bao and Thi (2021), Roza and Zulhirawati (2023), Bakhov et al. (2024), Li et al. (2024) ***(5 studies)***
5	Professional and technical preparedness	Exposure to CAT tools aligns students with real-world market expectations.	Odacıoğlu and Kokturk (2015), Bouguesmia (2020), Han (2020), Omar et al. (2020), Al-Rumaih (2021) ***(5 studies)***
6	Accessibility and inclusion	AI tools are often free, mobile-friendly, and usable offline, aiding students in diverse contexts.	Le and Dao (2019), Yanti and Meka (2019), Bouguesmia (2020), Deng and Yu (2022), Laksana and Komara (2024), Li et al. (2024) ***(6 studies)***
7	Reflective learning and personalization	Students receive tailored feedback, fostering critical thinking and reflective practice.	Soysal (2023), Bakhov et al. (2024), Li et al. (2024), Omar and Salih (2024) ***(4 studies)***
8	Teacher support and pedagogical innovation	Older educators found AI helpful for modernizing pedagogy and offering real-time feedback.	Liu and Afzaal (2021), Soysal (2023), Koka (2024) ***(3 studies)***

These benefits are evidence for enhancing both the teaching and learning experiences. These technologies improve efficiency and speed, particularly in repetitive or technical tasks, while also enriching students' vocabulary and grammar through exposure to diverse language structures. Learners benefit from practical support in drafting and post-editing, which fosters deeper engagement and reflective learning. Additionally, AI enhances motivation, confidence, and professional readiness, ensuring alignment between training in universities' academic environments and real-world expectations in the translation industry. Importantly, these tools promote accessibility and inclusion, providing personalized feedback that enhances critical thinking. Furthermore, teachers find AI invaluable for innovating pedagogy and delivering real-time support.

The Challenges of AI Translation Tools in Tertiary-Level Translation Education

Table 4

The challenges of AI translation tools in translation education

Ord.	Theme	Key Description	Supporting Studies
1	Overreliance and critical thinking decline	Students may become too dependent on AI, affecting creativity, analytical skills, and autonomy.	Yanti and Meka (2019), Bouguesmia (2020), Han (2020), Deng and Yu (2022), Bao and Thi (2021), Tavares et al. (2023), Zhang (2023), Roza and Zulhirawati (2023), Soysal (2023) ***(9 studies)***
2	Accuracy and contextual limitations	AI tools often misinterpret idioms, cultural nuances, and domain-specific content.	Bouguesmia (2020), Liu and Afzaal (2021), Tavares et al. (2023), Zhang (2023), Soysal (2023), Laksana and Komara (2024), Omar and Salih (2024) ***(7 studies)***
3	Digital divide and tool accessibility	Inequality in access to devices, reliable internet, and paid platforms hinders full integration.	Odacıoğlu and Kokturk (2015), Al-Rumaih (2021), Koka (2024), Li et al. (2024) ***(4 studies)***
4	Insufficient training and pedagogical gaps	Both educators and students lack structured training in AI and post-editing, causing skill gaps.	Kenny and Doherty (2014). Odacıoğlu and Kokturk (2015), Omar et al. (2020), Al-Rumaih (2021), Omar and Salih (2024) ***(5 studies)***
5	Ethical and privacy concerns	Using AI tools may expose sensitive data and raise concerns over data ownership and job loss.	Kenny and Doherty (2014), Bouguesmia (2020), Liu and Afzaal (2021), Soysal (2023), Koka (2024), Omar and Salih (2024) ***(6 studies)***
6	Usability issues for senior educators	Older lecturers struggle with non-intuitive interfaces, affecting adoption.	Bouguesmia (2020), Soysal (2023), Koka (2024), Li et al. (2024) ***(4 studies)***
7	Lack of institutional support and curriculum integration	Few programs offer comprehensive AI or CAT tool training; many syllabi are outdated.	Kenny and Doherty (2014), Odacıoğlu and Kokturk (2015), Han (2020), Omar et al. (2020), Al-Rumaih (2021) ***(5 studies)***

As highlighted in Table 4, the increasing incorporation of AI in translation education brings with it seven significant challenges at the university level, including: overreliance and critical thinking decline (found in 9/20 studies), accuracy and contextual limitations (7/20), digital divide and tool accessibility (4/20), insufficient training and pedagogical gaps (6/20), ethical and privacy concerns (5/20), usability issues for senior educators (4/20), lack of institutional support and curriculum integration (5/20). The studies show that many students face overreliance on AI outputs, limited contextual accuracy, and digital inequity. Both teachers and students lack structured training. Moreover, ethical issues such as data privacy, authorship, and the professional displacement of human translators require urgent attention.

As seen in the findings, the foremost concern is the potential for students to become overly reliant on AI, which can affect the development of independent critical thinking and creativity.

Furthermore, AI's limitations in interpreting nuanced language, idioms, and cultural contexts can compromise accuracy. Structural issues, such as unequal access to devices and internet connectivity, contribute to digital divides. Additionally, both teachers and students frequently lack formal training in AI and post-editing practices. Ethical and privacy issues also lead to worries about owning data and losing jobs. Senior lecturers find it challenging to use AI tools and get inadequate institutional support, leading to outdated curricula without sufficient integration of AI tools.

Discussion

Based on the thematic analysis of the 20 studies, we could easily identify that a key benefit of AI translation tools (especially MT and CAT) is the acceleration of the translation process. Both students and teachers agreed that AI aids them in completing tasks faster, freeing up time for post-editing, critical reflection, or supplementary tasks. Bouguesmia (2020) and Tavares et al. (2023) revealed that students appreciated NMT tools for speeding up draft creation, which allowed more time for revision. Han (2020) emphasized that CAT tools like TM significantly reduce redundancy, making translation faster. Also, Zhang (2023) and Deng & Yu (2022) affirmed that MT tools help students manage complex texts, reducing cognitive load. Omar et al. (2020) found that students' translation production was faster when using SDL Trados and other CAT tools. Therefore, efficiency is a primary benefit of AI translation tools, aligning with classroom goals and industry standards and reflecting the views of students and teachers in various educational contexts.

As for vocabulary and grammar enhancement, AI translation tools often suggest synonyms, grammatical structures, and terminology, helping students to expand their linguistic awareness, especially when comparing AI output with manual solutions. Yanti and Meka (2019) found that students learned new vocabulary incidentally through app usage. Le and Dao (2019) observed that students exploited online dictionaries to gain a nuanced understanding of word usage and collocations. Bao and Thi (2021) revealed that online dictionaries and grammar checkers (e.g., Grammarly, Longman Dictionary) helped students revise their language more effectively. To be more specific, Laksana and Komara (2024) showed that DeepL improved students' grammar awareness and vocabulary learning. Roza and Zulhirawati (2023) affirmed that ChatGPT enhanced vocabulary acquisition, with students noting clear improvement in word choice. It can be seen that AI tools function as both translation engines and incidental learning environments, offering instant vocabulary and syntax feedback that aids language acquisition.

AI tools show their great support for translation drafting and post-editing. Many of the 20 studies found that students often use AI-generated translations as first drafts, which they then post-edit. This process improves linguistic accuracy and helps them practice industry-relevant skills like MTPE (Machine Translation Post-Editing). In Tavares et al. (2023), students could

use MT tools to generate and refine their translation drafts effectively. Omar and Salih (2024) stated that translation quality was enhanced in the post-editing thanks to AI integrating into classroom practice. Zhang (2023) and Bakhov et al. (2024) found that AI-assisted post-editing encouraged critical reflection and iterative improvement. In brief, the use of AI as a drafting tool supports both learning and skill-building. When combined with post-editing, it fosters reflective and quality-focused translation pedagogy.

Motivation and confidence boost are clearly evidenced from these studies. AI tools reduce intimidation for would-be translators at universities, giving them a tangible starting point. This increases motivation and reduces the fear of failure, especially with difficult or technical content. Bakhov et al. (2024) demonstrated improved student motivation and participation after integrating AI-assisted tools. Omar et al. (2020) reported a notable rise in student confidence when working with CAT tools. Li et al. (2024) found that perceived enjoyment and usability directly impacted students' intention to adopt AI tools in future learning. Obviously, motivational benefits are a critical pedagogical strength of AI tools, especially for underconfident or early-stage translators.

AI tools are a good means for students' professional and technical preparedness. In detail, familiarity with CAT tools and AI-based systems prepares students for real-world professional translation environments, especially in localization, legal, and technical fields. Han (2020) and Odacıoğlu and Kokturk (2015) argue that industry-standard tools (e.g., SDL Trados) must be taught in academia to meet market demands. Omar et al. (2020) found that exposure to software improved student readiness for specialized domains. Al-Rumaih (2021) linked CAT tool proficiency to improved job prospects. Thus, AI tool training is not only a pedagogical strategy but also a career-readiness imperative.

AI-driven tools provide accessibility and inclusion for translation practice. Their features, such as being mobile and free, offer equalizing potential for students with limited resources or access to traditional classroom infrastructure. Le & Dao (2019) and Yanti and Meka (2019) emphasized how mobile dictionary apps enable ubiquitous learning. Deng and Yu (2022) found that multimodal AI tools (voice, OCR, etc.) enhanced access across diverse linguistic backgrounds. Laksana and Komara (2024) noted that DeepL offered a user-friendly and inclusive interface for multilingual translation needs. As a result, it is recognizable that translation tools provide low-barrier, high-impact access to translation practice, supporting inclusion across geographies and educational systems.

AI tools serve as valuable resources for reflective learning and personalization by providing instant feedback, which enables students to critically assess and iteratively refine their translations. This approach is consistent with learner-centered, reflective pedagogies. Research by Bakhov et al. (2024) indicated that students became more reflective through cycles of AI-based feedback. Additionally, Omar and Salih (2024) highlighted the significance of the MTPE in fostering higher-order translation reasoning, while Soysal (2023) demonstrated that AI facilitates engagement with complex tasks such as corpus curation and contextual adaptation. Therefore, using AI tools with thoughtful post-editing strategies significantly enhances reflective and personalized learning experiences.

Lastly, AI translation tools are utilized to support teachers and foster pedagogical innovation. They assist teachers in modernizing curricula by providing simulation-based tasks and real-time assessments and by aligning with industry practices. Koka (2024) observed that while some older lecturers faced challenges with technology, many found AI to be advantageous in their teaching once they received proper training. Liu and Afzaal (2021) highlighted how AI transforms traditional lecture models into interactive learning systems. Soysal (2023) advocated for collaborative pedagogies that merge AI with human reflection. Therefore, AI plays a crucial role in pedagogical renewal, particularly when paired with professional development and curricular restructuring.

As synthesized from 20 studies, a consistent challenge identified is students' overreliance on MT outputs, which leads to a decline in critical thinking skills. Research indicates that many students become excessively dependent on these technologies, thereby weakening their independent decision-making, creativity, and analytical reasoning, which are essential skills for professional translation. In Yanti and Meka (2019), many students felt that they became "lazy" due to using Google Translate too much. Similarly, in Bao and Thi (2021), students' heavy dependence on Google Translate without proofreading led to literal or awkward translations. The findings from Tavares et al. (2023) showed that the dependence on MT limits students' skill development. With the same view, Zhang (2023) found that despite the convenience of MT, many students feared that it lessened their creativity and critical thinking. Han (2020) cautioned that repeated reliance on CAT tools could turn translation students into "editors of machines" rather than autonomous thinkers. Therefore, AI overreliance may leave long-term risks because students may move from an active learning state to a passive one.

Notably, accuracy and contextual limitations are another concern. AI tools still do not provide excellent translation equivalents in many cases of cultural awareness, idiomatic nuance, or subject-matter specificity. This is considered a major barrier when students tend to believe in the quality of AI translation suggestions. For example, in Tavares et al. (2023), consistent errors were found in technical domains when students used MT. Meanwhile, Bouguesmia (2020), Laksana and Komara (2024), and Roza and Zulhirawati (2023) reported concerns about their students' inability to handle abstract or culturally embedded phrases using DeepL and ChatGPT. Also, Omar and Salih (2024) showed that many students could not provide accurate equivalents for legal and dialectal nuances in their MT outputs. Soysal (2023) pointed out the limitations of AI's emotional intelligence, particularly in sensitive texts in their students' translation practice. All of these arguments show that AI translation tools lack a "human filter", a component that is essential for faithful, idiomatic, and context-aware translations. This is extremely important for student translators.

There exists some degree of digital divide in tool accessibility. In fact, equitable access to AI tools is still limited by geography, internet infrastructure, and technical fluency, especially among older educators and students in rural or low-income regions. Koka (2024) found that many older lecturers were in a struggle with AI tools due to their low tech literacy and inadequate training. Also, Li et al. (2024) discovered a rural student demographic with limited

exposure to translation technologies, despite general computer literacy. In former studies like Odacıoğlu and Kokturk (2015) and Al-Rumaih (2021), institutional inequities in tool licensing and lab access were revealed. It can be seen that AI transformation at various universities has often been unevenly conducted, which requires a long run to deal with.

Moreover, there are insufficient pedagogical gaps among universities. A major systemic issue is that AI and CAT tools are under-integrated into curricula, and both students and teachers are not always provided with formal training. This leads to misuse, underutilization, and anxiety toward AI adoption. For example, Omar et al. (2020) found that most teachers in their research sample had no formal training in CAT tools. Kenny & Doherty (2014) pointed out that many students and teachers found AI translation tools complex and hard to learn without a deep technical understanding. Al-Rumaih (2021) provided another reason that CAT tools were usually taught in some class meetings of a single course in most universities, leaving students ill-prepared for workplace use. Obviously, with inadequate pedagogical support for AI tool literacy, even the best technologies remain inactive in the classroom, which is challenging in the revision of tertiary-level translation programs.

Ethical and privacy concerns are increasing with the use of AI translation tools. Both students and teachers have now been warned of the risks associated with uploading data to AI platforms, especially in domains like legal or medical translation. Moreover, AI threatens to disrupt translation labor markets, sparking concerns about job displacement. In Koka (2024), ethical issues were raised regarding sensitive data shared on third-party platforms. Soysal (2023) pointed out that there were no privacy protocols and ways to prevent potential biases in AI systems. Omar and Salih (2024) found that MTPE literature has still ignored social and ethical implications, focusing too much on technical efficiency. Supportingly, Kenny and Doherty (2014) raised concerns about ownership and copyright issues in using cloud-based MT systems. Obviously, the AI integration is a certain trend in the world, but ethical fluency has not been considered part of translation education.

Senior lecturers' hesitation to use AI translation tools is of great concern. While their students may adapt quickly to AI technology, many older lecturers haven't refused to have some experience. This may result in their resistance, avoidance, and unequal adoption. Koka (2024) noted that many older lecturers avoid them due to unfamiliarity despite seeing the value of AI tools. Soysal (2023) affirmed that without adequate interface design, adoption lags among less tech-savvy teachers and students. Thus, for experienced teachers in translation programs, it is quite critical.

Lack of institutional support and curriculum integration is an interrelated issue with the challenge above. In translation programs of many universities, CAT or MT are considered elective or isolated components, rather than embedded in their curricula. This weakens their relevance and students' ability to explore AI tool literacy. Han (2020) and Odacıoğlu & Kokturk (2015) urged universities to align curricula with industry standards, including CAT tools and localization platforms. Omar et al. (2020) showed that most universities in their country didn't offer consistent tool exposure. Al-Rumaih (2021) emphasized copyright issues and faculty reluctance due to their universities' lack of investment. Thus, it still takes a long time to reform the use of AI tools as part of core pedagogical methods in translation programs.

The thematic analysis and discussion reveal multiple converging and diverging themes under benefits and challenges. The use of AI translation tools in tertiary-level translation training reveals a complex interplay between technological affordances and pedagogical limitations for both students and teachers. These detailed analyses make it clear that AI tools are both enabling and challenging the evolution of translation education. The focal point of this systematic review is not whether to use AI translation tools due to their benefits and/or challenges, but how to be fully aware of their effects and use them critically, ethically, and inclusively.

Conclusion

The integration of AI translation tools into translation education signifies a notable development in both pedagogy and technology. This systematic review synthesizes findings from 20 studies, emphasizing eight major benefits of AI translation tools in transformative potentials and seven challenges associated with the use of AI-assisted translation in tertiary-level training environments.

Based on the thematic findings of this systematic review, the following recommendations are proposed:

(1) *Curriculum redesign for the use of AI translation tools*: Translation programs should move beyond elective or standalone courses and embed AI-driven tool training across the curriculum. This includes the teaching of MTPE, terminology management, and ethical translation practices. It is essential to reflect the digital demands of the Industry 4.0 translation market in translation training (Han, 2020).

(2) *Critical and reflective use of AI translation tools*: Students should be taught to use AI tools as assistants, not authorities. Teachers should prioritize critical evaluation, post-editing, and comparison tasks that strengthen human judgment and discourage overreliance. Students benefit from AI-generated drafts but need training to refine and critique them effectively (Tavares et al., 2023).

(3) *Training and support for teachers*: Professional development programs must be offered to equip teachers, especially senior ones, with the digital fluency needed to adopt AI tools confidently. The lack of technical confidence among older instructors is a barrier to AI adoption in classrooms (Koka, 2024).

(4) *Ethical guidelines and AI literacy*: Universities should create clear ethical policies surrounding the use of AI in translation education as part of the AI-use policies for their whole systems. Students need early exposure to issues like data privacy, authorship, and AI bias to become responsible digital translators. Integrating ethical awareness into AI-focused translation education helps address the risks of bias and misuse (Soysal, 2023).

(5) *Invest in infrastructure and access equity*: Universities should ensure equitable access to licensed CAT tools, adequate lab facilities, and reliable internet to close the digital divide. Special support should be extended to rural learners and under-resourced institutions. Disparities in tool access among universities affect the quality of training (Al-Rumaih, 2021).

(6) *Foster industry-academia collaboration*: Educational institutions should partner with translation companies and AI developers to ensure that translation training reflects real-world market requirements, encouraging collaborative projects and internships. For example, academic training should be aligned with localization and project-based industry workflows (Odacıoğlu & Kokturk, 2015)

(7) *Support longitudinal research and evaluation*: Further research is needed to assess the long-term impact of AI on students' translation quality, critical thinking, and job market success. Mixed-methods studies and longitudinal data will deepen the understanding of AI's pedagogical values. For example, there exist gaps in empirical evidence on AI post-editing's educational effects (Omar & Salih, 2024).

This systematic review provides insights into AI translation tools in tertiary translation education, but some limitations exist. Firstly, it focuses on studies published in English, potentially excluding valuable research from other languages and contexts, especially studies from non-Western educational contexts where AI translation tools may be used differently. Additionally, the varied research designs limit the ability to draw broad conclusions. These limitations highlight the need for diverse, longitudinal, and contextually rich research in future studies. Future research may include studies published in multiple languages and sourced from a wider range of databases to capture various educational contexts, particularly non-Western ones. The employment of standardized evaluation frameworks can improve comparability across varied study designs with mixed-methods and longitudinal approaches. Also, socio-cultural and institutional factors should be considered to provide more contextually grounded and globally relevant insights into the use of AI translation tools in tertiary education.

Based on the findings from this systematic review, we can see that AI translation tools serve as valuable teaching and learning supplements when employed thoughtfully, ethically, and systematically, although they cannot replace human expertise in translation practice. The impact of these tools on translation education depends much on how universities, educators, and students utilize them as instruments of empowerment rather than mere shortcuts to automation.

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