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The Dynamics of Translation Teaching in the Era of Machine Translation: Challenges, Ethics, and Learning Strategies

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ABSTRACT

The development of automatic translation (machine translation/MT) technologies, such as Google Translate and DeepL, as well as applications based on generative artificial intelligence (AI), has brought significant changes to translation practice. While TM facilitates access to cross-language texts, it also presents new challenges in teaching translation. This article aims to examine the challenges and strategies for teaching translation in the era of automation through a literature review. The method used is a literature review of journal articles, books, and conference proceedings published between 2015 and 2025 that are relevant to translation pedagogy, student perceptions, and the ethical implications of using TM. The review identifies seven key challenges: declining student motivation to learn manual translation, the changing role of lecturers to evaluators and post-editors, difficulties in assessing the authenticity of student work, issues of ethics and academic integrity, the need for curriculum adaptation, differences in the quality of TM across languages, and resistance to and over-reliance on TM. Strategies proposed include integrating post-editing into the curriculum, process-based assessment, ethical education in the use of TM, critical learning by comparing human and machine translation results, and translation training for low-resource languages. This article concludes that lecturers play a role not only as teachers of translation techniques but also as facilitators of digital literacy and academic ethics. Recommendations are provided for further empirical research to validate this strategy in the local context of higher education.

Keywords: Machine Translation, Translation Teaching, Pedagogical Strategies, Academic Ethics, Post-Editing

I. INTRODUCTION

Advances in digital technology have drastically changed translation landscapes. Since the advent of online services such as Google Translate, the quality of automatic translation results has improved rapidly owing to the integration of neural machine translation (NMT) and large language models (LLM) [1, 2]. Today, platforms such as DeepL and ChatGPT not only produce more accurate translations but also capture semantic nuances and more natural language styles [3]. This phenomenon has significant implications for language education, particularly in translation instruction.

On the one hand, MT has become a tool that greatly facilitated students' access to and understanding of cross-language texts. However, on the other hand, its presence poses serious challenges for language teachers. Students tend to rely too heavily on MT, thus diminishing their motivation to master manual translation skills [4]. Furthermore, academic integrity issues arise because it is difficult to distinguish between student-generated and machine-generated translations [5].

The use of MT in academic contexts raises at least seven major problems, as reported in the literature. First, students' motivation to practice manual translation declines because they perceive MT results as sufficient [6]. Second, the role of lecturers has shifted from merely teaching translation techniques to evaluating MT results and post-editing supervisors [7]. Third, difficulties arise in assessing authenticity, as lecturers struggle to

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determine whether translated texts are genuinely students' work or machine-generated [8]. Fourth, ethical and academic challenges arise related to covert plagiarism and the lack of attribution for MT use [9]. And Fifth, the need for curriculum adaptation to include post-editing skills and critical evaluation of machine-generated output [10, 11]. Sixth, there are differences in MT quality across languages. For example, results for the English–Spanish language pair tend to be more accurate than those for English–Indonesian, requiring students to understand the limitations of machine translation in low-resource languages [12]. Seventh, there is resistance or over-reliance among students; some reject it altogether, while others rely solely on MT without critical reflection [13].

Several studies have highlighted the impact of MT on professional translation practice, but studies on its implications for teaching in higher education are limited [14]. Yet, language teachers are at the forefront of preparing students for the new reality in which human translators no longer merely produce translations but also act as post-editors and quality controllers [15]. Therefore, it is important to review the existing literature to identify the challenges faced by lecturers and the pedagogical strategies that can be implemented to address them. This article maps the findings of various previous studies to develop a conceptual framework for teaching translation in the MT era.

This article aims to identify the main challenges in teaching translation in the era of automation based on a review of the current literature, formulate relevant pedagogical strategies to address these challenges, and provide recommendations for developing translation curricula in higher education to align with academic and professional needs in the digital age.

II. METHODS

This study uses a systematic literature review approach to analyze the challenges and strategies of teaching translation in the era of machine translation (MT). This literature review was chosen because this topic is relatively new and continues to develop, necessitating a mapping of previous research to understand trends and gaps and their implications for higher education in Indonesia.

Data Sources. Data were obtained from scientific articles, conference proceedings, academic books, and research reports published primarily between 2015 and 2025, with several key sources before 2015 relevant to providing a historical foundation. This period was chosen because the last decade has been marked by the rapid development of neural machine translation (NMT) and its adoption in language education [16, 5]. Literature sources were accessed through international databases (Scopus, Web of Science, Taylor & Francis Online, SpringerLink) and national repositories such as Garuda and Neliti to ensure representation of the Indonesian context.

Article Selection Criteria. Inclusion and exclusion criteria were used to ensure the relevance and quality of the analysed articles. The inclusion criteria were as follows: (a) research discussing translation in language education, (b) studies highlighting the use of machine translation (MT) such as Google Translate, DeepL, ChatGPT, and similar tools in learning contexts, (c) publications written in English or Indonesian, and (d) research relevant to the context of higher education. The exclusion criteria included non-academic popular articles, purely technical studies on MT algorithms, and publications that were not available in full texts.

Data Collection Procedure. The search process was conducted using keywords such as machine translation in translation teaching, pedagogical strategies in translation, post-editing in higher education, and their Indonesian equivalents (machine translation, translation teaching strategies, and higher education). After collection, the articles were screened based on the relevance of their titles and abstracts and then fully read.

Data Analysis. The analysis was conducted using thematic analysis, with the following steps: (a) identifying the main challenges in teaching translation in the MT era, (b) categorizing proposed pedagogical strategies, (c) comparing findings across international and Indonesian studies, and (d) synthesizing the results to provide practical recommendations. The analytical approach in this study utilized tables and graphs to illustrate the findings quantitatively and visually.

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III. RESULTS AND DISCUSSION

A. Results

The results of this literature review indicate that research on translation teaching in the machine translation (MT) era has significantly increased since the mid-2010s, in line with the development of neural machine translation (NMT). Furthermore, the distribution of research is greater in international contexts than in Indonesian ones. Global studies are generally indexed in reputable international databases (e.g., Scopus, Web of Science, Taylor & Francis Online, and SpringerLink), whereas research contributions from Indonesia remain relatively limited.

Table 1. Distribution of Studies on Translation Teaching in the Machine Translation Era

No	Author and Year	Research Focus	Context	Database/Publisher
1	Clifford et al. (2013)	The influence of MT use on student motivation	International	*Machine Translation* (SpringerLink)
2	Niño (2009)	The use of MT in foreign language learning	International	*ReCALL* (Cambridge/Scopus)
3	Groves & Mundt (2015)	The issue of the authenticity of student work with MT	International	*Assessment & Evaluation in Higher Education* (Taylor & Francis/Scopus)
4	Garcia & Pena (2011)	Implementation of post-editing in translation curriculum	International	*Meta: Translators' Journal* (Scopus)
5	Bowker (2020)	Machine translation literacy in translation classes	International	*Translation and Interpreting Studies* (John Benjamins/Scopus)
6	Kenny (2022)	The role of lecturers as MT evaluators	International	Academic books (SpringerLink)
7	Lee (2022)	Ethics of using MT in education	International	*Journal of Language, Identity & Education* (Taylor & Francis)
8	O'Brien & Ehrensberger-Dow (2020)	Technology-based translation curriculum adaptation	International	*Translation and Interpreting Studies* (John Benjamins)
9	Mellinger (2017)	Integration of technology in translation education	International	*The Interpreter and Translator Trainer* (Taylor & Francis)
10	Nurhadi & Yuliasri (2018)	Quality of Indonesian-English MT	Indonesia	*Indonesian Journal of Applied Linguistics* (Scopus)

The literature analyzed highlights several key aspects. The literature review results indicate that the use of machine translation (MT) in translation instruction has brought significant changes to pedagogical practices in higher education. The challenges that arise can be grouped into seven main aspects: declining student motivation, changing roles of lecturers, difficulties in assessing the authenticity of works, ethical challenges, the need for curriculum adaptation, differences in quality between languages, and student resistance to and dependence on MT usage.

The distribution of the findings from the literature regarding the seven key challenges in translation instruction is presented in Table 1. This table provides quantitative details regarding the frequency of each challenge that emerged in the studies analyzed. To clarify the distribution patterns and facilitate comparisons between categories, the data were visualized graphically in Figure 1.

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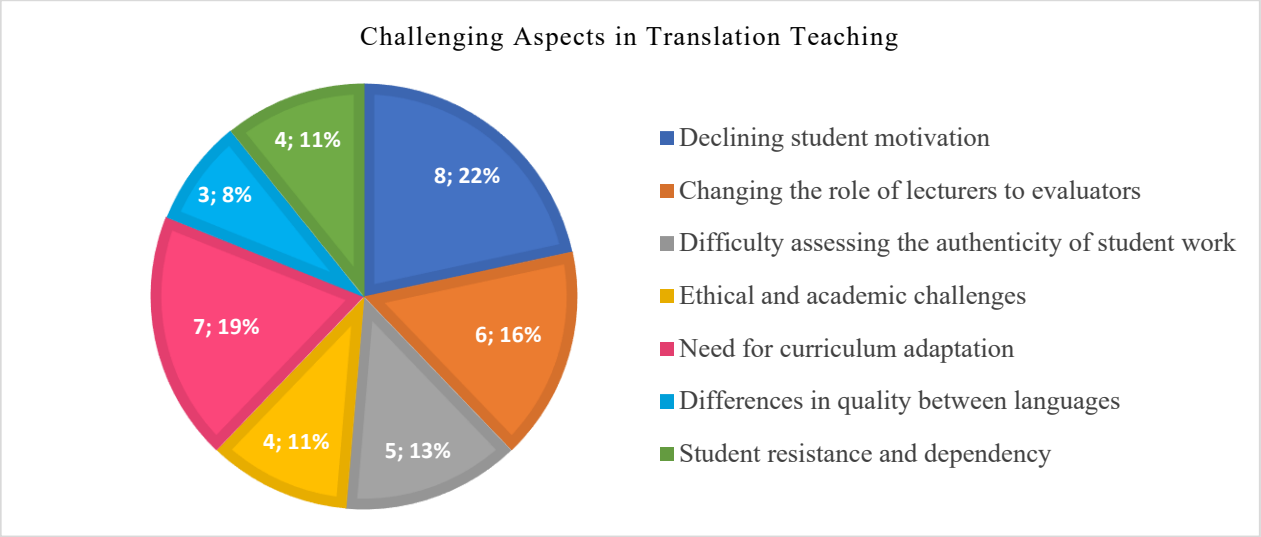


Figure 1. Challenging aspect in translation teaching

Figure 1 shows the distribution of research focuses related to the use of machine translation (MT) in translation instruction. The data indicate that declining student motivation is the most frequently reported challenge, followed by the need for curriculum adaptation and changes in lectures' roles. Meanwhile, issues of student resistance and dependence on MT emerged with the lowest frequency. These findings confirm that the literature focuses more on motivational and pedagogical impacts than on technical and ethical aspects.

1. Declining Student Motivation

A literature review indicates a decline in student motivation to learn manual translation skills due to the increasing use of machine translation (MT). Several studies have reported that students tend to rely on MT for instant gratification, thus reducing their efforts to develop manual linguistic analysis skills [6, 17]. Research in various countries has confirmed this trend. For example, van Lieshout found that language students increasingly use MT as a shortcut to complete assignments, which has implications for decreased cognitive engagement [18]. Urlaub also reported that MT use reduces students' opportunities to experiment with target language structures [19].However, studies have shown that over-reliance on MT decreases intrinsic motivation because students perceive the manual translation process as no longer essential [20, 21]. Local research in Indonesia has found similar trends. Gumartifa reported that some students use MT almost exclusively in their translation assignments, especially when facing tight deadlines [22]. This finding is in line with global studies that highlight a decline in motivation owing to the perception that MT results are sufficient [23, 24].

2. The Changing Role of Lecturers to Evaluators

Several studies indicate that the development of machine translation (MT) has changed the role of lecturers in teaching translation. Lecturers now function more frequently as evaluators and facilitators of post-editing rather than simply teaching manual translation techniques [16]. This shift occurs because students are increasingly accustomed to using MT as a starting point in the translation process. In this context, lecturers are required to master the skills of evaluating MT results, understand the principles of post-editing [25], and equip students with critical thinking skills to assess the quality of automated translations. Furthermore, Garcia and Pena emphasize that integrating post-editing training in academic settings is not just a trend but a necessity, given that the global translation industry now considers post-editing a core competency [26]. In fact, research by Carl, Bangalore, and Schaeffer found that students who practiced post-editing were able to increase their work speed and efficiency without sacrificing translation quality [27].

3. Difficulty Assessing the Authenticity of Student Work

The ease of access to machine translation (MT) presents new challenges for lecturers in assessing students' work authenticity. Groves and Mundt confirmed that translations obtained using MT are often difficult to distinguish from students' manual work, especially for general texts that do not require cultural sensitivity or idiomatic expressions [20]. This raises concerns regarding academic integrity in translation teaching. Niño found that students tend to use MT covertly in translation assignments, creating bias in assessments because lecturers cannot determine the extent of individual linguistic skills involved [28]. Clifford, Merschel, and

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Munné reported that most students consider the use of MT valid as long as it produces a "correct" translation, without considering aspects of originality [29].

4. Ethical and Academic Challenges

Ethical and academic issues are among the main challenges of teaching translation in the era of machine translation (MT). Lee's research shows that students often utilize MT to produce assignments that are almost entirely machine-generated, raising questions about academic honesty [30]. Groves and Mundt also highlighted that this practice can lead to new forms of plagiarism that are difficult to detect, as machine translation results are not identical to the source text, which can be checked using conventional anti-plagiarism software [8]. O'Neill found that most students lacked a clear ethical understanding of the limitations of MT use [4]. Many believe that MT use is not a violation of academic integrity as long as the results are linguistically accurate. This indicates a gap between technology use and students' ethical awareness in academic contexts.

5. The Need for Curriculum Adaptation

Research shows that traditional translation curricula, which focus on theory and manual practice, are increasingly considered less relevant in the era of machine translation (MT). O'Brien and Ehrensberger-Dow emphasized that technological developments have changed the competencies required of aspiring translators, requiring universities to adapt their curricula to better align with industry needs [13]. Mellinger introduced the concept of machine translation literacy, which is the ability to understand the potential and limitations of MT, evaluate output quality, and identify optimal strategies for its use [31]. This research emphasizes that MT literacy is crucial for equipping students to become not only passive users but also critical users of translation technology. Furthermore, many translation programs globally are slow to adopt technology-based modules, resulting in graduates often experiencing a skills gap when they enter the job market [32].

6. Differences in Quality Between Languages

The quality of machine translation (MT) results is highly dependent on the language pair. Nurhadi and Yuliasri showed that for low-resource languages like Indonesian, MT translation accuracy remains far below the standard, especially for complex texts [33]. Frequent problems include literal translation, grammatical errors, and failure to capture cultural nuances. According to Koehn, differences in MT quality are more pronounced in language pairs that lack large parallel corpora. For example. English–German tends to produce better output than English–Indonesian because of the greater availability of training data for German [34]. Castilho et al. also found that although neural-based MT has significantly improved translation quality, the imbalance in quality between languages remains a challenge [35].

7. Student Resistance and Dependence

Students' attitudes toward machine translation (MT) tend to fall into two extremes. Niño reports that some students refuse to use MT altogether, considering it unacademic and detrimental to the authenticity of the learning process [17]. However, there are groups of students who rely too heavily on MT, thus limiting their manual linguistic analysis skills [36, 37]. Clifford et al. found that students who rely heavily on MT often exhibit decreased motivation to develop manual translation skills, while students who reject MT altogether miss out on opportunities to understand how this technology can be effectively utilized [6]. Meanwhile, Bowker's research emphasizes the importance of guiding students to avoid falling into either of these extremes and instead establish a balance between the use of technology and human skills [5].

B. Discussion

Concerning the decline in student motivation, a literature review indicates a decline in manual translation skills due to the increasing use of machine translation (MT). Several studies have reported that students tend to rely on MT for instant gratification, resulting in reduced effort to develop manual linguistic analysis skills [6, 17]. This phenomenon can be explained through the framework of Self-Determination Theory, where the reduced need for cognitive effort decreases intrinsic motivation. With easy access to MT, students bypass the linguistic problem-solving process that should be central to translation learning, As a result, in-depth skills, such as semantic analysis, cultural sensitivity, and translation style selection, may fail to develop. Several pedagogical strategies can be implemented to address this problem. Post-editing training helps students recognize the limitations of MT while practicing revision skills [38]. Furthermore, comparative analysis tasks—comparing machine translation results with manual translation—encourage critical evaluation and increase cognitive engagement [5, 18]. Implementing process-based assessments, such as portfolios and revision logs, is also effective in reducing over-reliance on machine translation [20]. Thus, even if student motivation tends to

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decline, these strategies can help lecturers re-emphasize the importance of analytical skills, critical awareness, and ethical use of technology, so that machine translation is understood not as a substitute for, but rather as a complement to, manual translation skills.

The changing role of lecturers to evaluators is found in literature that indicates a shift in the pedagogical paradigm in translation teaching in the era of machine translation (MT). The role of lecturers is no longer limited to the transfer of manual techniques, but has shifted to that of evaluators and facilitators of the post-editing process. This shift indicates that learning now places greater emphasis on developing digital literacy and critical awareness in students utilizing AI-based translation technology. This situation aligns with the findings that emphasized the importance of evaluation competency as a core skill so that prospective translators can assess, improve, and adjust MT results to industry standards [39]. The implications can be seen from two perspectives. First, from a curriculum perspective, translation study programs at universities need to add courses or modules on post-editing, translation quality evaluation, and translation technology literacy. Garcia and Pena confirms that post-editing-based learning strategies enable students to understand the limitations of MT while simultaneously practicing critical analysis skills. Second, from a competency perspective, lecturers need to develop digital expertise to effectively guide students [9]. Many language educators face a skills gap when it comes to integrating MT tools into their learning. Therefore, strategies such as ongoing training for lecturers are essential to strengthen their capacity to manage classrooms increasingly oriented toward human-machine collaboration [13]. Thus, the shift in the role of lecturers to evaluators can be viewed not only as a challenge but also as an opportunity. Through adaptive curriculum strategies and strengthening lecturer competencies, translation teaching can be more relevant to the needs of the global industry, which increasingly demands the ability to collaborate between humans and machines.

Literature findings also indicate that one of the major challenges in teaching translation in the era of machine translation (MT) is the difficulty in assessing the originality of students work. Assessments focused on the final product are increasingly irrelevant because MT can produce relatively good translations in a short period. Therefore, the main challenge for lecturers is not only to detect the extent to which students use MT but also to design an evaluation system that values the learning process and not just the translation results. The implications of these findings for assessment methods are significant. Several studies recommend implementing process-based assessments, for example, through portfolios, scaffolded assignments, and learning journals ([28]. These strategies encourage students to present staged drafts, revision notes, and critical reflections that demonstrate their involvement in editing the MT output. A similar approach emphasizes the importance of comparative analysis between machine and manual translation to foster students' critical awareness of language quality [5]. Beyond the technical aspects, this issue is also closely related to academic integrity. Universities need to develop clear policies regarding the use of MT to minimize the risk of plagiarism and pseudo-original work [8]. Briggs added that students tend to be more transparent in acknowledging MT use when lecturers openly discuss its limitations and academic ethics [40]. Therefore, strategies that emphasize process, transparency, and critical reflection are key to ensuring that assessments remain authentic and oriented toward student skill development.

Research findings confirm that the ethical and academic challenges in teaching translation extend beyond the use of MT, but also to developing students' critical and ethical attitudes toward technology. This issue is increasingly relevant given that students tend to view MT as a substitute for manual skills, when in reality, the technology serves only as an aid. The ethical implications are quite clear. Translation ethics education needs to be integrated into the curriculum to ensure students understand the limitations of MT use. MT should be viewed as a means to increase productivity, not as a substitute for human skills [30]. Similarly, it was recommended that classroom discussions on academic honesty and digital ethics strengthen students' awareness of their academic responsibilities [20]. Strategies that emphasize digital ethics education and transparency in MT use can help foster an understanding that human skills remain at the heart of translation practice. The academic and professional implications are equally important. Students' honesty levels increased when instructors provided open discussions about the use of MT in academic assignments [40]. Meanwhile, in a professional context, translators are required not only to be proficient in post-editing but also to understand digital ethics issues such as copyright and professional responsibility [16]. Therefore, a holistic strategy combining clear academic policies, transparency-based pedagogy, and the instilling of professional ethics from an early age can be the answer to the ethical and academic challenges arising from the presence of MT.

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Curriculum adaptation is urgently needed to ensure that translation instruction remains relevant to technological developments. Integrating technology into the curriculum requires the addition of modules on machine translation (MT) literacy, post-editing, and systematic translation quality evaluation. This will equip students with both practical skills and a critical understanding of technology [31]. Furthermore, an interdisciplinary approach is necessary, as translation is not only about linguistic aspects but also encompasses digital competencies, ethics, and industry awareness. In line with O'Brien and Ehrensberger-Dow, the curriculum should introduce students to CAT tools, AI principles, and collaborative practices between humans and machines. In the context of Indonesian higher education, curriculum adjustments must also consider infrastructure readiness and teaching capacity [13]. Wicaksono emphasized that the main challenges to technology integration in language education lie in limited training for lecturers and disparities in access between institutions [11]. Therefore, a technology-based curriculum development strategy is not simply about adding new material; it demands pedagogical transformation that integrates technological, ethical, and industrial dimensions. This ensures that graduates not only understand the potential and limitations of MT but also possess competencies relevant to the demands of the digital era and are thus employable.

The findings also demonstrate that translation students must be aware of the limitations of machine translation (MT) quality, especially in the Indonesian context. One pedagogical approach that can be implemented is error analysis exercises. Lecturers can ask students to identify weaknesses in MT translations in specific fields such as law, economics, and literature. This exercise hones linguistic sensitivity and builds students' critical awareness of technological limitations [33]. Furthermore, it is important to emphasize the domain-specific aspects of translation. The quality of MT tends to decline when used in specialized domains, such as legal or academic texts, which require precise terminology [32]. Therefore, translation learning should be directed toward developing students' skills in evaluating MT results within the context of the field being translated. This approach trains them to be more sensitive to the specific needs of each text. Variations in MT quality between languages also emphasize the importance of strengthening multilingual competence. Professional translators are still needed to bridge the quality gap, especially for languages that lack technological support [22]. Thus, a translation curriculum should not only focus on the use of technology but also deepen the mastery of the source and target languages. This makes differences in quality between languages not merely a technical challenge but a pedagogical opportunity to train students to become more critical, adaptive, and contextually aware translators.

Both student resistance and dependence on machine translation (MT) present pedagogical challenges. Therefore, learning strategies must be directed toward fostering an adaptive and critical attitude toward translation technology. One approach that can be implemented is the introduction of MT from the beginning of the course, emphasizing its function as an aid and not a replacement for human skills [17]. This approach can minimize student resistance while providing them with the opportunity to understand the advantages and limitations of MT in real-world contexts, enabling them to assess the technology more objectively. However, strengthening manual analysis remains a key pillar of the learning process. Manual linguistic analysis exercises provide a strong foundation for language structure, whereas MT can be used as a starting point for critical discussions [6]. Thus, students' professional readiness is determined by their ability to balance the roles of humans and machines. An adaptive attitude toward MT reflects readiness for the modern translation industry, where human-machine collaboration is inevitable [5]. With this approach, resistance and dependency can be shifted into critical awareness, so that students are able to position MT as part of the translation ecosystem, not as a threat or just a shortcut.

Overall, teaching translation in the era of machine translation (MT) faces multiple challenges, including declining student motivation, changing lecturer roles, difficulty in assessing work authenticity, academic ethics, curriculum adaptation, language quality gaps, and extreme student attitudes. Students often rely on MT, reducing manual practice, while lecturers must focus on post-editing and evaluation tasks. Assessing originality is difficult, and digital plagiarism raises ethical concerns. Curriculum adaptation is needed to teach MT literacy and evaluation skills, as language quality differences, especially in low-resource languages such as Indonesian, make manual skills essential. Balancing student resistance and dependence requires careful pedagogical strategies, highlighting the need for an integrative, ethical, and adaptive approach to translation education in the digital era.

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IV. CONCLUSIONS

Teaching translation in the era of machine translation (MT) faces various complex and interrelated challenges. Students show a decline in motivation to hone manual skills, while the role of lecturers shifts to that of evaluators, demanding mastery of post-editing skills. Furthermore, issues of authenticity of student work, as well as issues of ethics and academic honesty, are becoming increasingly prominent as the boundaries between human and machine contributions become increasingly blurred. Another challenge lies in the need to adapt the curriculum to technological developments while also considering the variations in quality between languages, which often place Indonesian at a disadvantage. Equally important, students' tendency to shift from extreme resistance to dependence on MT demands pedagogical strategies that foster a critical and balanced approach.

Addressing these challenges requires a comprehensive and integrative strategy. Translation education must combine MT literacy, manual analysis exercises, process-based evaluation, and discussions of digital ethics to equip students with relevant skills. The curriculum must also be adapted to accommodate new skills, such as post-editing and critical error analysis. With this approach, students will be prepared not only for academic challenges but also for the needs of an industry that increasingly relies on human-machine collaboration.Thus, translation education in higher education can remain relevant, ethical, and responsive to the dynamics of the digital era.

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