

RETHINKING TRANSLATOR TRAINING AS A CROSS-CUTTING TECHNOLOGICAL WORKFLOW

ПЕРЕОСМИСЛЕННЯ ПІДГОТОВКИ ПЕРЕКЛАДАЧІВ ЯК НАСКРІЗНОГО ТЕХНОЛОГІЧНОГО ПРОЦЕСУ

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Modern translator training faces a structural mismatch: technology is typically taught as a set of isolated modules, one tool per topic, while professional translation practice treats these same tools as an interconnected workflow in which a single instrument routinely performs functions attributed to several distinct stages. This article reframes the translation process as a technological chain comprising four interrelated components – pre-translation analysis, CAT-assisted translation supported by an AI agent, quality management, and file preparation – and argues that these components are better represented as a network of overlapping actions than as a linear sequence of self-contained stages. Drawing on both theoretical models of translator competence (PACTE's instrumental competence, the EMT framework) and empirical studies of specific tools and stages, the article identifies a gap between well-established theoretical support for cross-cutting technical competence and its still-fragmented empirical and classroom validation. The study demonstrates, through classroom examples – including the pre-editing of auto-generated video subtitles using regular expressions and a comparative analysis of PDF-document translation across several CAT environments – that a single technological action routinely crosses the boundaries between the four proposed stages, undermining the pedagogical logic of modular instruction. The article proposes a network model of the translation technological chain, in which the four components function as conditional nodes connected by feedback and cross-cutting links rather than fixed sequential order, and grounds this model in the broader concept of a translator's digital literacy. The findings support a concrete pedagogical principle: technical competence formation should be organized around cross-cutting, project-based assignments that require students to move across several nodes of the model, rather than around isolated tool-specific modules. The article concludes by identifying directions for further research, including the applicability of the proposed model to team-based translation workflows and an unresolved gap between the documented professional importance of quality-management tools and students' comparatively modest perception of their value.

Key words: translator's technical competence, digital literacy, CAT tools, machine translation, artificial intelligence in translation, translation quality management, cross-cutting integration, network model.

Сучасна підготовка перекладачів стикається зі структурним протиріччям: технології зазвичай викладаються як набір ізольованих модулів, по одному інструменту на тему, тоді як професійна перекладацька практика розглядає ці самі інструменти як взаємопов'язаний робочий процес, у якому один інструмент регулярно виконує функції, що традиційно приписуються кільком різним етапам. У статті перекладацький процес переосмислено як технологічний ланцюжок, що охоплює чотири взаємопов'язані складові – доперекладацький аналіз, переклад у CAT-середовищі за підтримки ШІ-агента, управління якістю та підготовку файлу, – і обґрунтовано, що ці складові точніше описуються як мережа взаємопроникних дій, ніж як лінійна послідовність самодостатніх етапів. Спираючись як на теоретичні моделі перекладацької компетентності (інструментальну компетентність PACTE, Рамку EMT), так і на емпіричні дослідження окремих інструментів і етапів, у статті виявлено розрив між усталеною теоретичною підтримкою розподіленої технологічної компетентності та її досі фрагментарною емпіричною й практичною апробацією. На прикладах із навчальної практики – зокрема, доперекладацького редагування автоматично згенерованих субтитрів засобами регулярних виразів і порівняльного аналізу перекладу PDF-документів у кількох CAT-середовищах – продемонстровано, що одна й та сама технологічна дія регулярно перетинає межі чотирьох запропонованих етапів, що ставить під сумнів дидактичну логіку модульного викладання. У статті запропоновано мережеву модель технологічного ланцюжка перекладацького процесу, у якій чотири складові функціонують як умовні вузли, поєднані зворотними та перехресними зв'язками, а не жорсткою послідовністю, і обґрунтовано цю модель ширшим поняттям цифрової грамотності перекладача. Отримані результати підтверджують конкретний дидактичний принцип: формування технічної компетентності доцільно організовувати навколо наскрізних, проєктно-орієнтованих завдань, що вимагають від студента проходження через кілька вузлів моделі, а не навколо ізольованих модулів, прив'язаних до окремих інструментів. У висновках окреслено напрями подальших досліджень, зокрема застосовність запропонованої моделі до командної роботи над перекладацьким проєктом та невирішений розрив між задокументованою фаховою важливістю QA-інструментів і порівняно поміркованим сприйняттям їхньої цінності студентами.

Ключові слова: технічна компетентність перекладача, цифрова грамотність, CAT-технології, машинний переклад, штучний інтелект у перекладі, управління якістю перекладу, наскрізна інтеграція технологій, мережева модель.

Problem statement and its relevance to important scientific or practical tasks. Modern translators face a combination of pressures that did not exist a decade ago: exponentially growing volumes of source material, an expanding and rapidly changing set of digital tools required to process it, and the widespread perception that artificial intelligence threatens to displace the profession altogether. These pressures are not merely technological but pedagogical, since translator training programs must prepare graduates for a market whose tool requirements shift faster than curricula can be revised.

Translator education has traditionally responded to this challenge by treating technology as a supplementary subject: individual tools are introduced as discrete topics, each covered in isolation, with the assumption that competence in the overall technological workflow will emerge as the sum of these separate skills. This modular approach, however, does not reflect how translation technologies are actually used in professional practice, where a single tool frequently serves multiple functions across different stages of the process, and where the boundary between one stage and the next is rarely as fixed as the curriculum implies.

This article approaches translation as a workflow rather than a single act of text conversion – a sequence of technologically mediated stages, each requiring the translator to identify and apply an appropriate set of tools. We argue that understanding this workflow as an interconnected process, rather than a checklist of unrelated skills, is essential both for individual translators managing a project independently and for teams distributing the same workflow across multiple specialists within a translation agency.

Analysis of recent research and publications. Traditionally, scholars have described the translation process as a sequence of discrete stages, each demanding its own tools and competences – L. Ivashkevych and R. Zaluzhnyi, for instance, distinguish six such stages and argue that translator training should be organized accordingly [1]. As we can see it from more recent work, however, this stage-based framing is giving way to a market-oriented reading of the same process: S. Bondarenko and K. Bondarenko ground their analysis in ISO 17100:2015, showing that commercial concepts such as the "effective word" are calculated from technological analysis performed before translation even begins [3], while L. Ivashkevych's work on regular expressions demonstrates that a single tool routinely performs functions attributed to several different stages at once [4] – evidence that the boundaries the stage-based model assumes are considerably more permeable in practice than in theory.

On the one hand, scientists agree that technical competence is now central to translator training, as reflected in both PACTE's instrumental competence [2] and the EMT framework [3]. On the other hand, these models diverge sharply in how this competence should be structured pedagogically: PACTE treats it as one delineated component among several, whereas EMT distributes technology-related outcomes across nearly a third of its entire framework [3, p. 200] – a divergence between a compartmentalized (modular) and a distributed (cross-cutting) model that is the point of departure for this study.

Empirical support for either position, however, remains narrow. Yuan and Li offer one such anchor: structural equation modeling on 446 students shows digital literacy significantly predicts perceived post-editing competence [5], lending psychometric weight to the cross-cutting position – but the finding is confined to a single stage (post-editing) and does not address the workflow as a whole. Şen Bartan supplies a rare classroom-level test of the cross-cutting model itself, embedding corpus tools directly into a translation course rather than as a separate module, with predominantly positive results [6] – yet this, too, is limited to one tool category within one genre of translation, leaving open whether the same logic extends across the full technological chain.

Taken together, these findings shape the direction of the present article: if cross-cutting technical competence is theoretically favored and empirically supported at the level of individual tools and stages, but has been tested in the classroom only in isolated cases, there remains a need for a workflow-level model that treats the entire technological chain – not a single tool or stage – as the unit of pedagogical design. This is the gap the present study addresses.

The aim of this article is to characterize the translation process as an interconnected technological workflow – encompassing pre-translation analysis, CAT-assisted translation with AI agents, quality management, and file preparation – and to substantiate a cross-cutting model of technical competence formation that treats this workflow as a single unit of pedagogical design, applicable to both individual translators and translation teams.

During the preparation of this article, the authors used the large language model Claude (Anthropic, model Sonnet 5) to assist with the preliminary structuring of material and the formulation of working ideas, as well as for language and stylistic editing of the text. All AI-generated suggestions were critically reviewed, verified, and edited by the authors, who take full responsibility for the content, accuracy, and conclusions of this article.

Presentation of the main research material.

Before turning to individual stages of the technological chain, it is worth naming the umbrella concept that unites the skills discussed below: a translator's digital literacy – the ability to effectively and critically access, evaluate, and create information in digital environments [5], closely related to digital competence, the ability to confidently and safely select and apply ICT across professional contexts [7]. As shown above, this competence is empirically measurable and depends on higher-order metacognitive skills – critically evaluating a tool's output rather than merely operating it [5]. The skills discussed below are therefore not a disconnected list but concrete manifestations of this single, broader competence.

Pre-translation analysis: corpus tools, AI, and regular expressions. The pre-translation stage draws on at least three complementary – not redundant – tool categories: corpus analysis, AI-based text analysis, and regular expressions (regex).

Among corpus tools, Voyant Tools is well suited to teaching purposes: an open-source platform offering 29 analytical functions, including word-frequency counts, concordance building, and collocation analysis, useful for a rapid preliminary assessment of a source text's terminological density and lexical complexity [8]. Şen Bartan's classroom study confirms the didactic value of this approach – students rated corpus tools helpful or very helpful for stylistic analysis – while also identifying a clear limitation: such tools handle lexical and grammatical analysis well but cannot automatically detect figurative language, which still requires instructor involvement [6]. Corpus tools should therefore be presented to students as instruments with a bounded scope, not a universal analytical solution.

AI-based tools complement corpus analysis where the latter falls short – identifying semantic and structural issues that complicate machine translation. K. Tsuji analyzed 554 sentences and identified 19 problem factors, most frequently the absence or ambiguity of a sentence subject, from which she derived six concrete pre-editing rules: simplifying sentences, stating all necessary sentence elements, attending to logical placement and semantic connections, and considering domain-specific vocabulary [9]. This demonstrates that AI-assisted pre-translation analysis is a sequence of targeted editorial decisions that can be taught as a distinct skill – provided it is applied critically rather than mechanically, since default tool settings encode linguistic and cultural assumptions that require data literacy to recognize and calibrate [10].

The interaction of several tools within a single assignment is best illustrated by subtitling instruc-

tion. Students translating auto-generated YouTube subtitles must first pre-edit the extracted text, which includes timecodes and is often incorrectly segmented: they copy the transcript into a document, apply the regular expression ``[0-9](:[0-9]{2})`` to remove timecodes, then merge fragments into coherent sentences and restore punctuation and capitalization. This confirms Ivashkevych's observation [4] that a single regex tool can serve several functions attributed to different stages of the traditional model simultaneously, and illustrates cross-cutting rather than modular technology integration: students acquire regex skills as a natural means of solving a concrete problem, not as an abstract topic.

Translation in a CAT environment with integrated machine translation and an AI agent. This stage is illustrated through Wordfast Anywhere (WFA) rather than the more established RWS Trados Studio, for two practical reasons: WFA is an academic partner of the institution, and, more importantly, it is a web-based service running on any device, including smartphones – creating comparable in-class conditions regardless of whether a student has a laptop or only a phone.

Beyond accessibility, WFA illustrates a broader shift in CAT-system development: from machine translation as a supporting function toward full integration of a generative AI agent. In 2025, the service introduced AI Enhance, applying generative AI to the target segment at the click of a button [11]. This differs fundamentally from conventional MT: the standard Translate function generates a translation of the source segment, while AI Enhance instead transforms an already-existing target-language draft according to a user-defined prompt – refining rather than generating.

Configuring such an agent involves connecting a language engine (ChatGPT, Claude, Gemini, Mistral) via API key; the translator then works with pre-configured or custom prompts. A prompt for AI Enhance typically includes the source and target languages, the source text as context, the current draft, and a specific instruction – for example, shortening the text, adjusting tone, converting to gender-neutral language, or checking terminology and grammar [11]. This last function is effectively an automated quality check performed within the translation environment itself, showing that the boundary between translation and quality management, already porous with regard to regex, proves permeable here as well.

Pedagogically, working with an AI agent requires students to formulate and iteratively refine prompts directly within a translation task – prompt engineering acquired through application, not as an abstract

topic, since each generation can yield a different result even for an identical instruction. A further consideration is ethical: unlike conventional MT, which sends only the source text externally, AI Enhance also transmits the translator's own target-language work, requiring translators to judge whether this is appropriate for confidential material.

Quality management across the translation workflow: built-in and standalone tools. Quality management is often treated as a single action at the end of the process, but Vela-Valido's ISO-based distinction – quality estimation (predicting MT quality before post-editing), quality assurance (meeting requirements during translation), and quality control (checking a finished translation against a reference) [12] – shows it is distributed across the entire cycle, from a pre-translation "quality gate" deciding whether a segment needs post-editing [13] to built-in CAT checks and final proofreading.

QA functionality is now standard in virtually any CAT tool – built into Trados and Smartcat alongside translation memory [15] – and terminology inconsistency remains the leading cause of rework [14]. Classroom use of OmegaT (which checks tags, spelling, terminology, and grammar via LanguageTool) illustrates why this matters: terminology checks can flag a correctly inflected translation as an error simply because the glossary records the term in the nominative case, since the system compares strings, not lexemes. V. Petrova documents comparable false positives in standalone tools such as Xbench, concluding that most flags are false positives without meaning the tools miss genuine errors – every flag requires critical evaluation, not automatic correction [14]. Standalone applications like Verifika offer more flexible settings than built-in modules but require calibration for the target language, particularly for morphologically rich languages such as Ukrainian. Grammarly, by contrast, checks target-text language quality without comparing to the source, making it a useful but narrowly scoped post-editing complement [16].

No automated system can fully replace a human reviser: EN 15038 requires review by someone other than the translator, and the Human-in-the-Loop model formalizes this as an iterative cycle in which human feedback improves the system itself – now recognized as an emerging area of translator specialization [17]. Google Translate's mistranslation of "Romware" as software for the Roma community, rather than its correct technical meaning, illustrates why: the error is syntactically flawless, so no automated QA mechanism would flag it, and only domain expertise can catch it [15, p. 29]. Human evaluation is not flawless either – inter-annotator agreement is often low [12] – which

suggests the optimal model combines both rather than replacing one with the other.

Competence at this stage therefore combines three skills: technical (running the appropriate tool), analytical (distinguishing genuine errors from false positives), and professional (recognizing automation's limits and one's own irreplaceable role).

Complementary skills: file formatting and visualization services as the final stage of the technological cycle. The technological chain does not end with quality management: translated material must reach a form suitable for delivery. L. Ivashkevych and R. Zaluzhnyi's economic argument makes the stakes concrete – an unsuitable file format without specialized software adds roughly ninety minutes per ten pages compared to a format already prepared for translation [1, p. 652], directly affecting productivity and cost. OCR tools (ABBYY FineReader, Adobe Acrobat Pro, FreeOCR) handle text recognition, but preserving document structure – tables, diagrams – remains the harder challenge, since conversion frequently distorts it.

A recurring classroom assignment makes this concrete: comparing translation of an unprepared PDF (uploaded directly to Google Translate) against the same document converted to an editable format, which demands substantial manual reconstruction wherever tables or diagrams fail to convert correctly. CAT tools compound the problem by handling PDFs inconsistently – OmegaT extracts plain text only, losing all formatting; WFA converts to .docx but prompts the user to verify the result; MateCat preserves formatting automatically but frequently misaligns text and visual space in complex documents, since sentence length differs between Ukrainian and English. This is a further instance of the article's central argument: a file-preparation problem directly affects target-text quality and requires renewed proofreading, intersecting again with quality management. Students typically conclude that requesting the client's original editable file, or choosing a CAT tool suited to the source format, is preferable to reactive correction – extending technical competence into client communication.

A related, narrower skill concerns infographics services such as Canva, already documented in the literature on interdisciplinary student projects producing posters and infographics [18]. Though bordering on localization, which this article excludes, it is a logical extension of formatting competence: text volume rarely matches its allotted visual space, requiring translators to adapt content within a fixed template rather than delegating this entirely to a designer.

A generalized model of the technological chain and the rationale for its cross-cutting integration. The four components discussed above – pre-translation analysis, CAT-based translation, quality management, and file preparation – appear to form a linear sequence. The material presented, however, has shown this linearity to be a didactic simplification: regex applies equally to pre-translation analysis and post-editing; AI Enhance performs a quality-assurance function within translation itself; a file-preparation error requires renewed proofreading, returning the process to quality management. A more accurate model is therefore a network of overlapping actions organized around four conditional nodes, not a fixed sequence.

The four nodes – pre-translation analysis, CAT-based translation, quality management, and file preparation – can be visualized as arranged in a circle rather than a line, each connected to its two neighbors by bidirectional links. The arrows represent movement between any two nodes, not only clockwise progression: from quality management back to file preparation, from translation to quality management within a single action, from file preparation back to analysis. None of the four nodes is an isolated module with its own discrete toolset; each is a center of gravity for actions recurring at other stages.

This has a direct pedagogical consequence: training organized around isolated modules cannot represent the structure of professional practice. The EMT framework, distributing technology-related competences across nearly a third of its entire framework [3], and Şen Bartan's classroom implementation of cross-cutting corpus-tool integration [6], provide precedent for an alternative – coursework built around integrated projects, as demonstrated by the subtitling and PDF-comparison assignments above, in which students encounter technology as a natural component of a professional task rather than an isolated topic. This idea is not new – Ivashkevych and Zaluzhnyi called for comparable project-based training in 2020 [1] – but remains more a recommendation than established practice [3].

Finally, the model has a forward-looking dimension: quality-management corrections made by a human reviser can update terminology bases and refine pre-translation settings for future projects [19], turning the model into one capable of continuous self-improvement – a property distinguishing

genuinely hybrid translation from purely mechanical automation.

Conclusions. This article examined the translation process as a technological chain comprising four interrelated components: pre-translation analysis, CAT-based translation with an AI agent, quality management, and file preparation. Across all four, tools and problems consistently crossed stage boundaries, motivating a network rather than a sequential model: four conditional nodes connected by feedback and cross-cutting links.

This reframing carries a direct pedagogical consequence: training organized around isolated modules cannot represent the non-linear structure of professional practice. The cross-cutting model advocated in the theoretical framework discussed above, and already implemented, if narrowly, in at least one documented classroom setting, supports an alternative – coursework built around integrated projects requiring students to move across several nodes of the model, as demonstrated by the examples above. The study's contribution is therefore twofold: a network model making explicit what stage-based models leave implicit, and a concrete pedagogical principle – cross-cutting, project-based task design – that follows from it, extending rather than contradicting the modular and cross-cutting models already established in translation studies.

Several questions remain open. Team-based translation work was deliberately excluded: an individual student progressing through the model's four nodes is not the same as a distributed team, where each node may be handled by a different specialist. Whether the same logic holds when nodes are physically distributed across people is a natural next step. A second gap concerns a tension the reviewed literature does not resolve: at least one empirical study found that students rated editing and proofreading tools as only moderately influential on competence formation, a finding difficult to reconcile with this article's argument for the centrality of quality management – whether this reflects insufficient classroom emphasis or a genuine pedagogical limitation remains an open question. Finally, the network model itself awaits empirical testing: whether cross-cutting, project-based instruction produces measurably stronger competence than modular instruction, and what instruments could capture a network rather than a linear structure.

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