

## From the race to machine translation to generative AI: Implications for the Translator Education

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**Abstract:** As with any other field of knowledge, technological advances have affected Translation Studies. The emergence of machine translation in the 1940s and CAT Tools almost 40 years later and the recent confluence of these with generative artificial intelligence have both optimized the work of translators and demanded of them. Particularly, they are increasingly demanding a new kind of knowledge, namely technological knowledge. In view of this scenario, this essay seeks to reflect on the work of professors in the technological education of translators. The reflections to be presented focus on teaching and learning processes related, above all, to machine translation technologies and translation memory systems in their interfaces with generative artificial intelligence. In the midst of these reflections, this essay provides some historical perspectives on the incorporation and impact of translation technologies on the translator's work and education.

**Keywords:** Translator Education. Machine Translation. CAT Tools. Generative Artificial Intelligence.

## Da corrida pela tradução automática à IA generativa: Implicações para a formação de tradutores

**Resumo:** Como ocorre com quaisquer outros campos do conhecimento, os Estudos da Tradução também são tocados pelos avanços tecnológicos. O surgimento da tradução automática na década de 1940 e das

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CAT Tools quase 40 anos depois, além da confluência dessas com a inteligência artificial generativa, tanto otimizou os trabalhos de tradutores quanto exigiu deles, e vem exigindo cada vez mais, um novo saber, qual seja, o saber tecnológico. Diante disso, este ensaio busca refletir sobre o trabalho docente na formação tecnológica de tradutores. As reflexões a serem apresentadas têm como foco os processos de ensino e aprendizagem relacionados, sobretudo, às tecnologias de tradução automática e aos sistemas de memória de tradução, em suas interfaces com a inteligência artificial generativa. Em meio a tais reflexões, serão enfatizados certos prismas históricos sobre a incorporação e impacto das tecnologias da tradução no trabalho e na formação do tradutor.

**Palavras-chave:** Formação de Tradutores. Tradução Automática. Ferramentas de Auxílio à Tradução. Inteligência Artificial Generativa.

## 1 Introduction

Earlier in 2025, I was invited to deliver a lecture in CITRAT/LETRA/TRADUSP Webinar Series, organized by GREAT, the Study Group on Adaptation and Translation of the School of Philosophy, Literature, and Human Sciences at the University of São Paulo. Based on my previous studies (Esqueda, 2024), I titled my presentation “Translation Technologies and the Translator Education”. In this text, I intend to compile my thoughts from that webinar into an essay.

To get started, there are at least two observations I would highlight in the title I proposed, i.e., “Translation Technologies” is in the plural form, and “Translator Education”, in the singular form. What I will attempt to argue until the end of this essay, similar to what I did in the webinar, is an idea of a translator education that is linked to a humanistic, historical and cultural perspective. Although this idea seems to be simple, and probably thought of by many other educational scholars in our field, besides the widespread work of Vygotsky (2000), this sort of education can be built through *collaborative work* amongst translators and other professionals, leading us towards a collective intelligence, instead of an artificial one.

Based on these first ideas, this essay is divided into two parts. In the first part, I intend to revisit an “interpretive journey” regarding the incorporation of translation technologies into the work and education of translators, which I have presented at previous events and manuscripts (Esqueda, 2024)<sup>2</sup>. This incorporation has gone through

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<sup>2</sup> The aforementioned “interpretive journey” discussed herein represents the logical continuation of the Brazilian Portuguese publication by Esqueda (2024).

phases, which we could also call historical assumptions. They are mainly in the interregnum between the 20<sup>th</sup> and 21<sup>st</sup> centuries and encompass the race to machine translation, passing through CAT Tools, up to generative AI, launched in 2022, such as ChatGPT and others.

In the second part, I will seek to illustrate how a humanistic, historical and cultural education can lead us to the production and construction of knowledge through collaboration between translators and other professionals (Esqueda, 2019), besides incorporating the translation technologies into the translator education.

Before I begin, I would like to inform readers that this essay does not purport to be a methodological treatise, nor a didactic proposition. Rather, it is a critical essay, one in which I undertake a reflection on the work of educators in the technological education of translators. In the course of my reflections, I make several excisions, omit numerous historical connections and surely overlook many authors of significant importance to the subject matter.

1. The incorporation of translation technologies into the translator work and education

To understand how translation technologies have been incorporated into the translator work and education, it is important, in my view, to consider the phases through which this incorporation has passed (a word of warning: none of these phases has been superseded yet). I would name the first phase as the “anti-technological phase”; the second, the “descriptive phase”; the third, the “superfluous” (or unnecessary) phase; and the fourth, the “metainstrumental phase”. There is a fifth phase, which I will turn to in the second part of this essay. In any case, we are talking about, as I previously mentioned, the interregnum between the 20<sup>th</sup> and 21<sup>st</sup> centuries.

### *The anti-technological phase*

The anti-technological phase possibly began when machine translation arrived in our country (Brazil) in software displayed at translation conferences. Software such as Systran, Globalink Power Translator Pro, Alta Vista, amongst others, promised to eliminate language barriers without the need for human intervention. It was no coincidence that we saw slogans such as “Give your translator a vacation”; “It’s like having a personal translator” (Darin, 2001; Yang; Lange, 1998).

This sort of promise, however, was not fulfilled. Although technology companies tried to convince translators with flattery, telling them that with machine translation they could optimize their translation work, look for more jobs, and therefore earn more money, the fact was that machine translation proved to be anti-social, anti-spiritual, and anti-natural. Anti-social because it hardly helped the progress of translators and translations, and no one got richer with it; anti-spiritual because it destroyed the beauty and the spirit of the languages; and anti-natural because it became too inhuman, i.e., too artificial to be taken seriously. The universities quickly organized themselves to denounce all of this.

One of the main scientific works of this anti-technological phase, at least in Brazil, is the Master’s thesis defended by Luzia Aparecida de Araújo, in 1993. This thesis answers, very appropriately, the question: “Why are computers incapable of translating?”. The author claims that: [...] *for the sole reason that a program may be capable of replacing one word or an entire sentence with another one, but it will never be able to attribute meanings to them* (Araújo, 1993, p. 118, my own translation).

Darin’s paper (2001) also addresses that question, showing how machine translation was (is) anti-social, anti-spiritual, and anti-natural. She argues that,

[...] what is most powerful and intriguing about language is denied [with machine translation]: the imprecisions, the gaps, the suggestions, the subtexts, the perspectives; in short, the inherent and infinite space between what is said and what is yet to be said, between you and me. (Darin, 2001, p. 16, my own translation)

The translation teaching and learning classroom throughout Translation Programs had no other option but to implement a comparative and post-structuralist technological education.

This approach was typically related to the postmodern movement, and possibly influenced, particularly in Brazil, by the thoughts of Rosemary Arrojo (1986), in whose book, *Oficina de Tradução* (Translation Workshop, in my free translation), we read: [...] *if translating simply depended on memorizing a few rules and knowing a foreign language, machine translation would have managed to replace the translator* (1986, p. 78, my own translation).

Thus, machine translations were compared to human translations, and the purpose of the translator education involving these topics was to emphasize: no! Computers are not capable of translating.

Amidst all this, in the international scenario, the American researcher John Hutchins explained that,

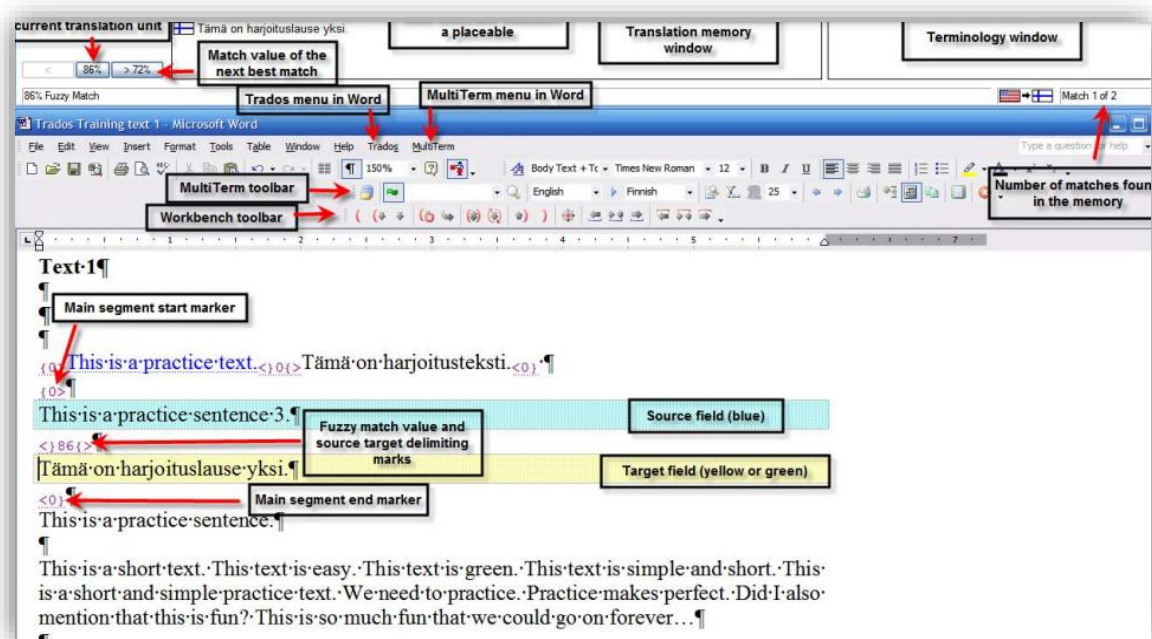
In 1964, United States government sponsors were increasingly concerned about the lack of progress; they created the Automatic Language Processing Advisory Committee (ALPAC), which concluded in its report (ALPAC, 1966) that machine translation was slower, less accurate, and twice as expensive as human translation, and that “there was no immediate or foreseeable prospect of the emergence of a useful machine translation system.” The report attested that there was no need for the United States to invest more in research involving machine translation; instead, it recommended the development of tools to aid translation, such as electronic dictionaries, and continued support for research in the field of Computational Linguistics. (Hutchins, 2015, p. 122, my highlights)

This recommendation was strictly followed by technology companies, mainly because the volume of work increased significantly and continues to increase (Nimdzi Insights, 2025), and they created what are now known as CAT Tools, in reference to Computer Assisted (or Aided) Translation Tools.

### The descriptive phase

When Trados (RWS, 2024), a globally renowned CAT Tool, was created in 1984 as a supplement to Word (Figure 1), we entered in a descriptive phase of the incorporation of technologies into the translator’s work. As personal computers were “arriving at the desks” of ordinary users (Dunne, 2020), the combination of translation memories with the Microsoft Word environment was, let us say, a “masterstroke”.

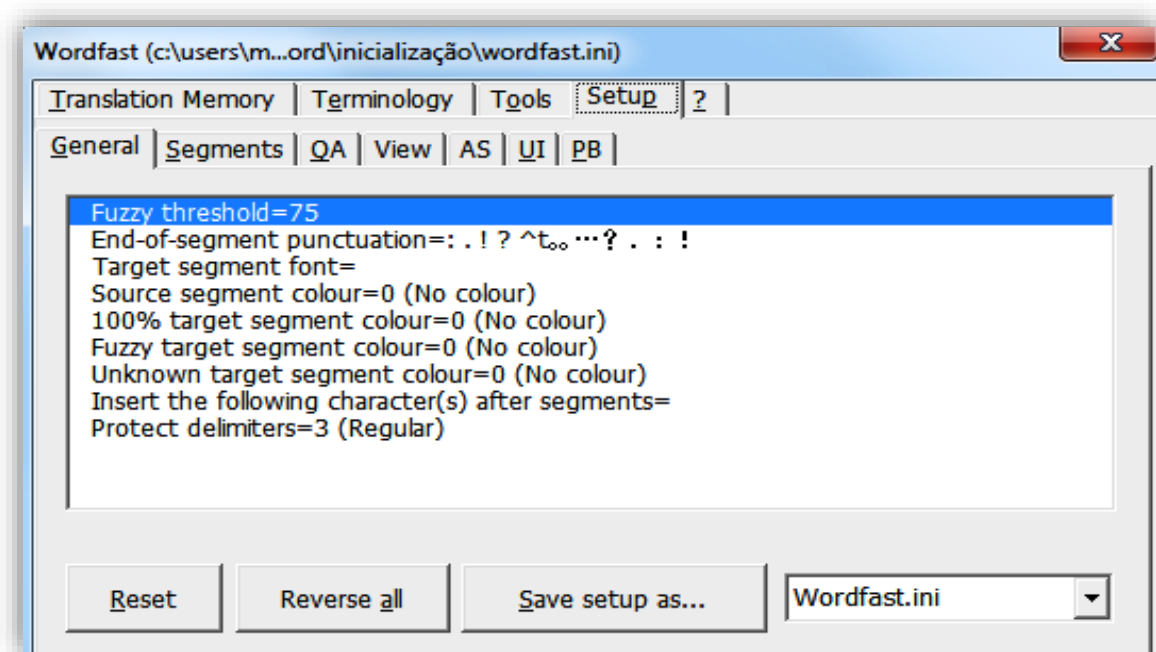
Figure 1 – Trados as a supplement to Microsoft Word



Source: the author’s archives.

The rise of WordFast in 1999 (Figure 2) (Wordfast, LLC, 2024), also as a supplement to Microsoft Word, created competition for Trados.

Figure 2 – WordFast as a supplement to Microsoft Word



Source: the author's archives.

Professional translators and frequent users of the tools came to their defense. If academia (Araújo, 1993; Darin, 2001) had once asked “Why are computers incapable of translating?”, now, in this phase, professional translators asked: why should one use translation memory systems? According to Nogueira and Nogueira (2004):

The resistance against computer assisted translation tools comes from the fact that most translators still do not understand that these tools do not translate but aid the translator to do a better job more comfortably, as well as from the confusion with machine translation that produces hilarious translations. (Nogueira; Nogueira, 2004, p. 17, my own translation)

The translation teaching and learning classroom had no other option but to implement a descriptive-definitional technological education. This descriptive perspective still demands a lot of work in translation classrooms, especially with regard to the concepts of golden (101%), full (100%), and fuzzy matches (above 75%, depending on the user's setting) between original and translated segments, and the functionality of

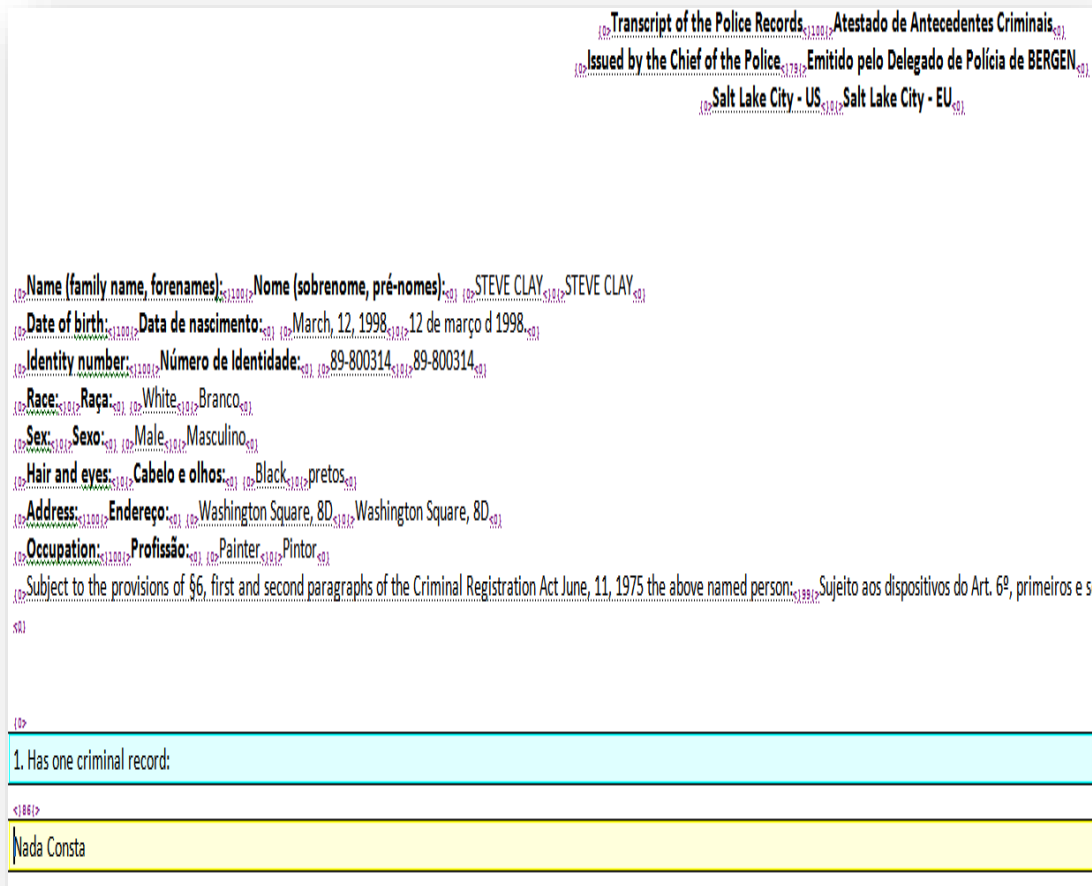
glossaries, corpora, etc. Nevertheless, this descriptive phase fails to establish a robust pedagogy. It remains restricted to the mere observation and memorization of tool functionalities, offering no structured framework for teaching and learning.

### *The superfluous (or unnecessary) phase*

As every machine can, eventually, “be flawed”, we moved on to a superfluous phase of the incorporation of translation technologies into the translator’s work and education. I call it “superfluous” because machines led us to new problems — namely, additional, unexpected, or unnecessary issues we had to deal with.

A study that illustrates this superfluous phase can be the one I developed with other colleagues in 2017 (Esqueda, Da Silva, and Stupiello, 2017). We asked translation students to translate, from English into Brazilian Portuguese, using a translation memory system, two legal texts, more specifically two transcripts of police records. In one of them, the applicant had no criminal record, therefore students committed the segment “*sem antecedentes criminais*” (with no criminal record) in the translation memory as equivalent to the phrase “has no criminal record”. As can be seen in Figure 3, the problem was that, in the second text, the applicant had a criminal record, explained through the phrase “has one criminal record”. As the translation memory system WordFast used in the study showed 86% of similarity between the segments (that of the second text and that recorded in the memory from the translation of the first text), due to the slight difference between “no” and “one” (86%) students did not “fix the defect” and accepted the segment provided by the translation memory. That is to say, the sentence “*Nada consta*” (nothing found or no criminal record), from the translation of the first transcript, causes a mechanical effect, a superfluous problem, on the translation of the second one, in which, in fact, the applicant had a record.

Figure 3 – Transcript of the Police Records, in English and Brazilian Portuguese, in the translation memory system WordFast



Source: Esqueda, Da Silva, and Stupiello, 2017, p. 178.

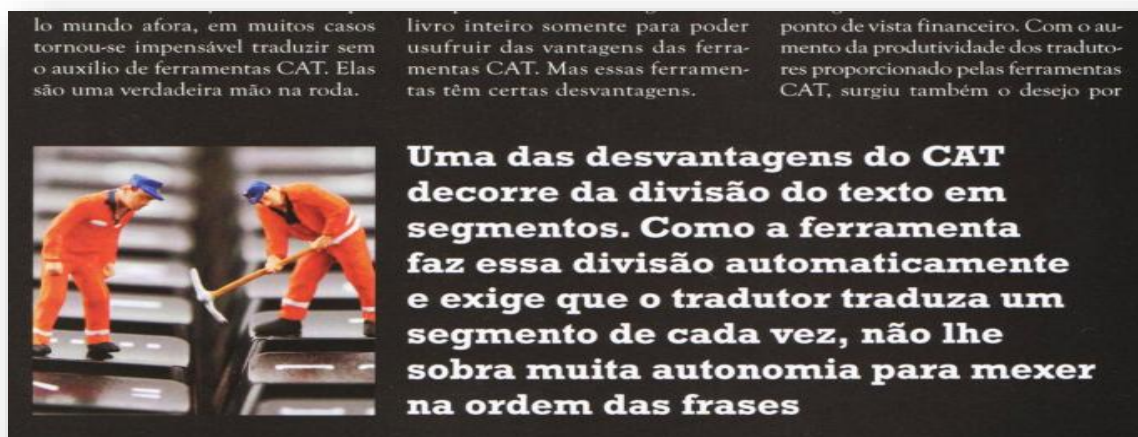
Other scholars also seemed ready to attack the superfluous issues that the tools brought forth. Alves then discusses the conundrum of human *versus* automatic segmentation:

Research aimed at a better understanding of the cognitive segmentation processes among translators in comparison with forms of computer-assisted translation gains importance. (Alves, 2004, p. 206, my own translation)

Problems arose from the tools. This superfluous phase could also be seen in magazine stands. This is the case of what we saw in the special edition of *Língua* magazine, in 2012 (Figure 4), where we read:

One of the disadvantages of CAT tools stems from the division of the text into segments. As the tool automatically makes this division and requires the translator to translate one segment at a time, the translator does not have much autonomy to change the order of the sentences. (Said, 2004, p. 30, my own translation)

Figure 4 – Excerpt of Fabio Said’s article in the Brazilian magazine “Língua” on CAT Tools



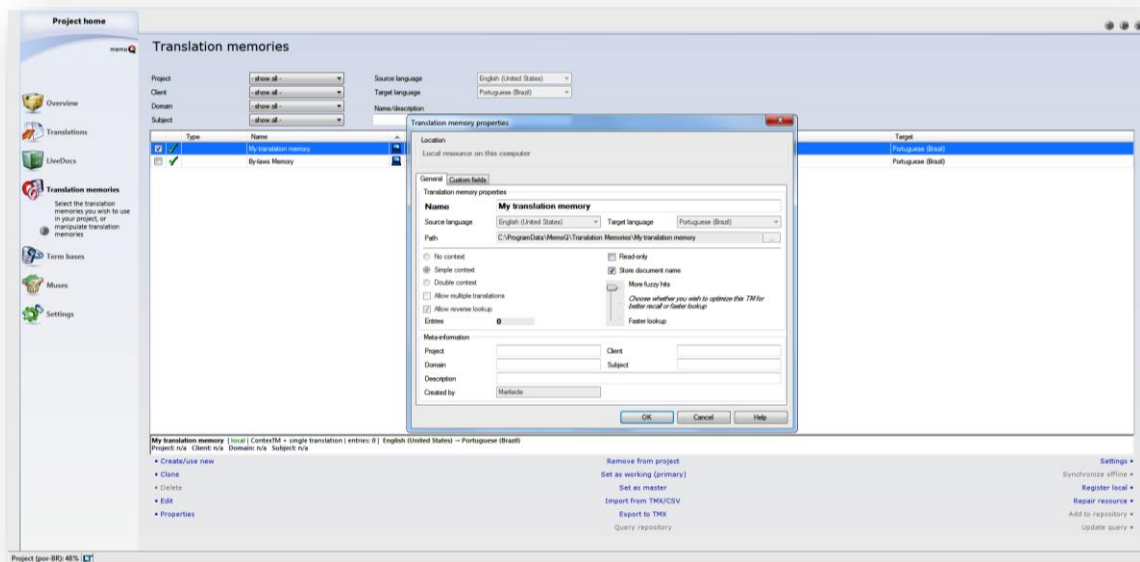
Source: Revista Língua (Said, 2012, p. 30).

In this superfluous phase, the translation teaching and learning classroom had no other option but to implement an analytical education, one of a comparative and cognitive nature. We needed to teach, in addition to the hotkeys (instrumental competence) of the systems, the importance of the mathematics involving textual segmentation (cognition and metacognition). The answer, in this phase, was “yes,” we should incorporate translation technologies into our translation classes, but for this incorporation we need to know that machines are a source of unforeseen problems.

#### *The metainstrumental phase*

From this point on, we arrived at a metainstrumental phase. The tools became robust. The F3 (concordance feature), F7 (spell checker feature), F10 (context feature), and F11 (list of errors feature) keys, to name but a few, are put into operation for translation quality assurance. In this phase, the functionalities of glossaries, corpora, reference texts, amongst others, are attached to all CAT Tools, particularly with the release of memoQ in 2004 (memoQ Ltd., 2024). In this phase, parallel, bilingual, or comparable corpora could be uploaded to the tool. The titles of these tools also changed, and they came to be called TEnTs, in reference to Translation Environment Tools. TEnTs like memoQ provide a highly specialized interface, where the initial screen, as showed in Figure 5 below, with its project creation options, memory linkages, and terminology panels, immediately presents a dense linguistic ecosystem for managing every facet of a translation project.

Figure 5 – Initial screen of memoQ (2004)

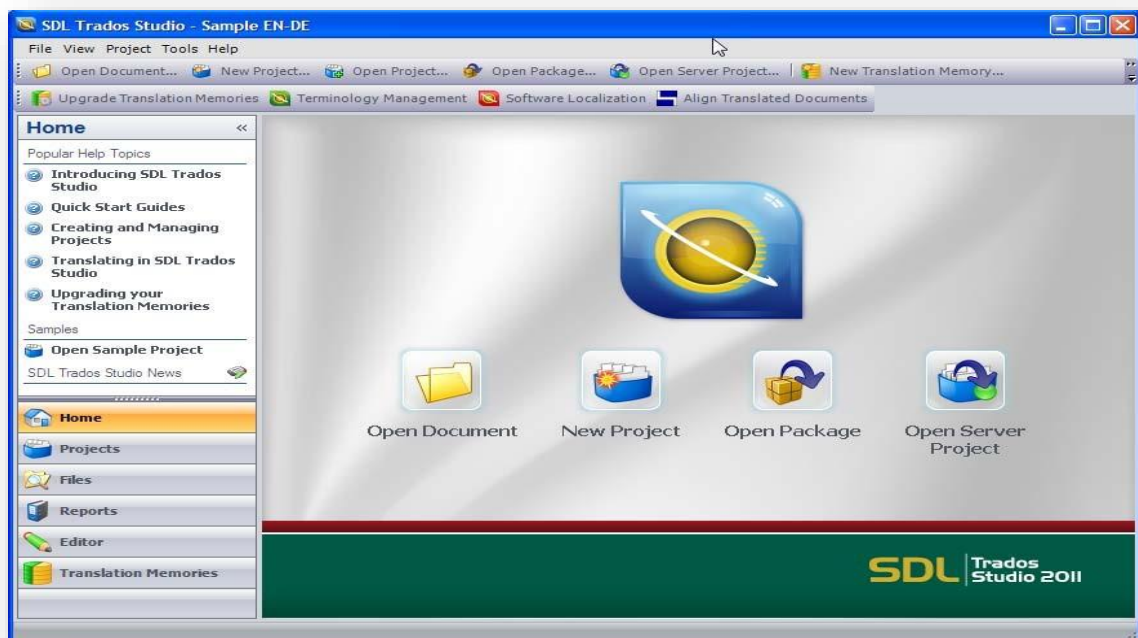


Source: the author's archive.

Even more complex was Trados Studio (RWS, 2024). In 2009, it launched the project management feature with its sharing functionalities amongst project managers,

translators, terminologists, linguists, reviewers, testing team, and clients. In addition to the coupling of powerful machine translation technologies, this CAT Tool became an “all-in-one” software (Figure 6). Based on this scenario, all a translator needed to do was to immerse in the tool and know how to navigate in a single environment, i.e., it was enough for educators to implement a “monotechnical approach”. In this case, a “monotechnical approach” in teaching and learning with all-in-one CAT Tools like Trados or memoQ means focusing instruction exclusively on the functionalities of a single, integrated tool, without adequately exploring the underlying translation theories, diverse technological landscapes, or the critical assessment of tool limitations. This can lead to a narrow understanding where students become proficient in one specific software’s workflow but lack the broader critical and adaptable skills essential for navigating the complex and evolving professional translation technology environment.

Figure 6 – Trados environment (versions 2009-2011)



Source: the author’s archives.

But this metainstrumental phase continuously evolves, acquiring new nuances beyond its initial scope. It also brought with it a chain of language services to speed up the management of translation projects. In Figure 7, we can see one of the screens of the MATECat Translation Memory System (Translated, 2025), a free online system developed by the Italian company Translated. MATECat stands for Machine Translation Enhanced Computer Assisted Translation Tool.

Figure 7 – MATECat first screen

The screenshot shows the MATECat interface for a translation project. At the top, there are tabs for 'Total word count', 'Industry weighted', and 'Matecat weighted'. Below this, the project ID is 10899031, and the source and target languages are English (USA) and Portuguese (Portugal) with 177 words. The project title is 'Outsource: Project Management + Translation', guaranteed by Translated. A translator named Mario by Translated is listed, with 1,145,079 words translated in the last 12 months and 1 year of experience. The project price is €15.58, and there is an option to 'Add Revision' for €9.20. The delivery date is 26 March at 02:00 PM (GMT-3:00), with a rate of about €0.088 per word. A green 'Order now' button is visible. At the bottom, there is a testimonial from Bruno Spagna, IT Manager, and contact information for Intradoc, including a phone number (+39 06 90 254 001) and an email address (info@matecat.com).

Source: the author's archives.

If the translator using this system does not have time to serve his or her client, he or she can outsource the translation in the same phase of the translation project creation. In Figure 7 above, just for illustration purposes, I uploaded a 177-word abstract into the

system, which, if outsourced, would cost 15.58 euros and would be delivered by 2:00 PM, on March 26, 2025, by a translator named Mario, who has one year of experience and is already in the company database. If one wants either to hire a proofreading service, he or she would pay an additional 9.20 euros.

As we can realize, there will be an ever-increased fusion between translation memory systems, machine translation, artificial intelligence, and the sales of translation services. In the case illustrated in Figure 7, for instance, the Italian company Translated is providing the translation technology and, at the same time, selling translation and other language services through it.

If a freelancer translator, for example, wants to finish the translation him or herself, the tool generates a Job ID for him or her, in reference to “job identification”. At the bottom of Figure 8 (left corner), a Job ID was created for me when I decided to manage, finish and deliver the translation for my supposed client. At this moment, I can start working as a freelancer for the technology company.

Figure 8 – Job ID creation in MATECat

The screenshot displays the MATECat translation interface. At the top, the logo 'matecat by translated' is visible on the left, and a file icon labeled 'Engenharia\_2025' is on the right. Below the header, the document title 'Atividade de estudo - MateCat.docx' is shown. The main content area is a table with four rows, each containing a lock icon, an ID number, and two columns of text: English on the left and Portuguese on the right. The first row shows the title 'Evaluation of permanent deformation of asphalt mixtures using different laboratory performance tests' and its Portuguese equivalent. The second row is labeled 'ABSTRACT' and 'RESUMO'. The third and fourth rows show specific text segments from the document and their translations. At the bottom of the interface, there is a progress bar for 'English (USA) → Portuguese (Brazil)' at 100%, and a statistics section showing 'Total words 287', 'Weighted 0', 'To do -', 'Speed ETC', and 'N/A Words/h'.

ID	English (USA)	Portuguese (Brazil)
4569659188	Evaluation of permanent deformation of asphalt mixtures using different laboratory performance tests	Avaliação da deformação permanente de misturas asfálticas utilizando diferentes ensaios de desempenho laboratorial
4569659189	ABSTRACT	RESUMO
4569659190	The laboratory tests were conducted to evaluate the effects of polyester fiber on permanent deformation of asphalt mixtures.	Os testes laboratoriais foram conduzidos para avaliar os efeitos da fibra de poliéster na deformação permanente de misturas asfálticas.
4569659191	The results indicate the fibers improve the deformation resistance of mixtures.	Os resultados indicam que as fibras melhoram a resistência à deformação das misturas.
4569659192	The confinements in the partial triaxial test (PTT) have significant effects on the permanent strain of mixtures.	Os resultados no teste triaxial parcial (PTT) têm efeitos significativos na deformação permanente das misturas.

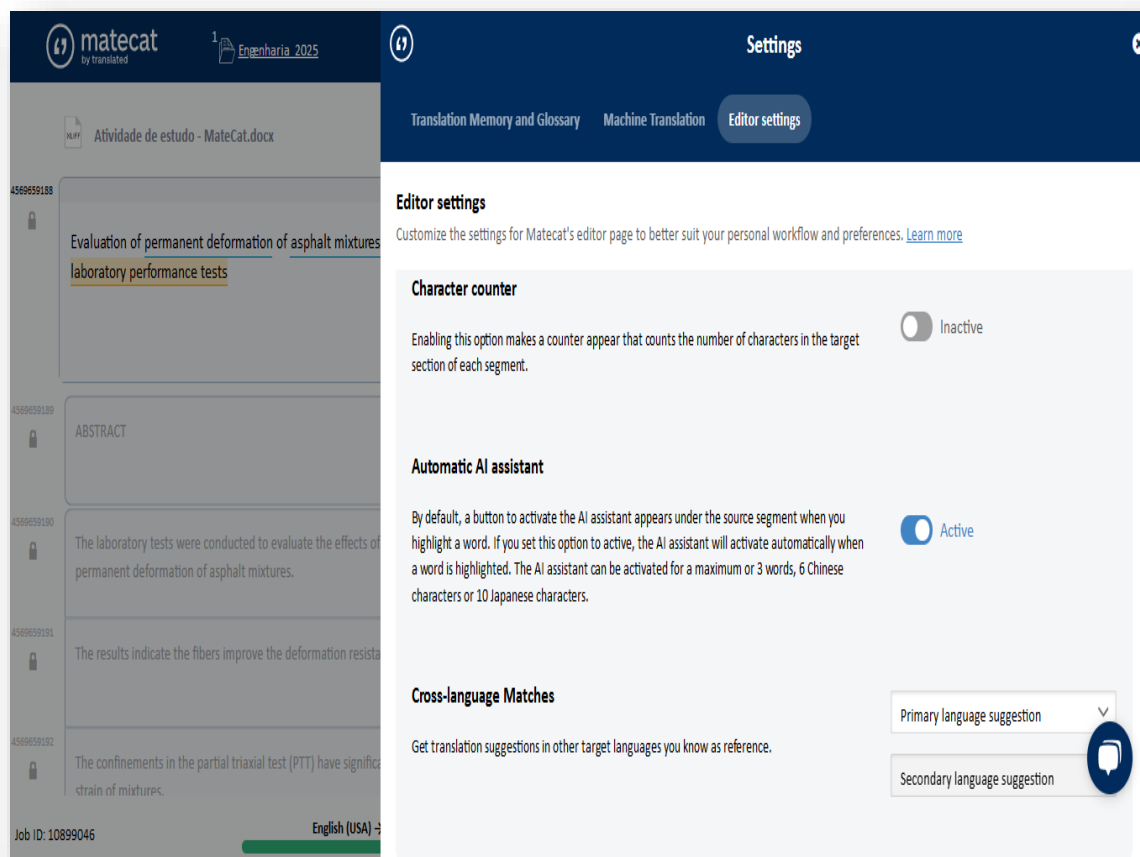
Source: the author's archives.

As I previously mentioned, in this metainstrumental phase, we see an increase in the chain of language services offered by translation technology companies through their translation systems. In this language service chain, we have the following features that today are embedded in the systems: sales, financial reports, project management, file management in the most diverse formats, file and text analysis, verification of available terminology, specific tabs for triggering translation, post-editing and proofreading functionalities. Additionally, through these systems, we can use machine translation and, more recently, generative artificial intelligence (henceforth GenAI).

Still using the MATECat system as an example, we see that, in its functionalities, the translator can enable the Automatic AI assistant, as shown in Figure 9. MATECat AI Assistant provides an explanation of the context-specific meaning of a word/phrase

powered by GPT-4, OpenAI's most advanced system according to MATECat user's guide (MATECat, n.d.). Thus, these sorts of AI assistants have become part of the current translation memory systems and, consequently, the translation workflow.

Figure 9 – Enabling Automatic AI assistant in MATECat



Source: the author's archives.

We see that the metainstrumental phase did not stop at the coupling of project management with its sharing functionalities amongst project managers, translators, terminologists, linguists, reviewers, testing team, and clients. In addition, we see the coupling of machine translation technologies and, more recently, of GenAI.

In this phase, the translator education had and still has few alternatives other than a competence-based training (rather than education), with emphasis on the instrumental

competence to cope with all these technologies. The prevailing global competence model (Hurtado Albir, 2017), unfortunately, mirrors a corporate organizational system, thus hindering the flexible endeavor of any educational initiatives. This corporate organizational approach often results in professors working in isolation, largely contributing to a fragmented curriculum.

2. An alternative for the incorporation of translation technologies into the work and education of the translator?

Let us move on to the second part of this essay. As stated in the Introduction, I will seek to illustrate how a humanistic, historical and cultural education can lead us to the production and construction of knowledge through collaboration between translators and other professionals (Esqueda, 2019), despite incorporating the translation technologies into the translator education.

In order to prospect some ideas, I will use, as an illustration, a scientific text that my students and I translated in 2024 in the Translator Training and New Tools course, which belongs to the Undergraduate Program in Translation at the Federal University of Uberlândia, in Brazil. In this course, the texts to be translated are usually commissioned by professors, also from UFU, who need translation of texts from or into English to use with their undergraduate students or professionals in their research groups.

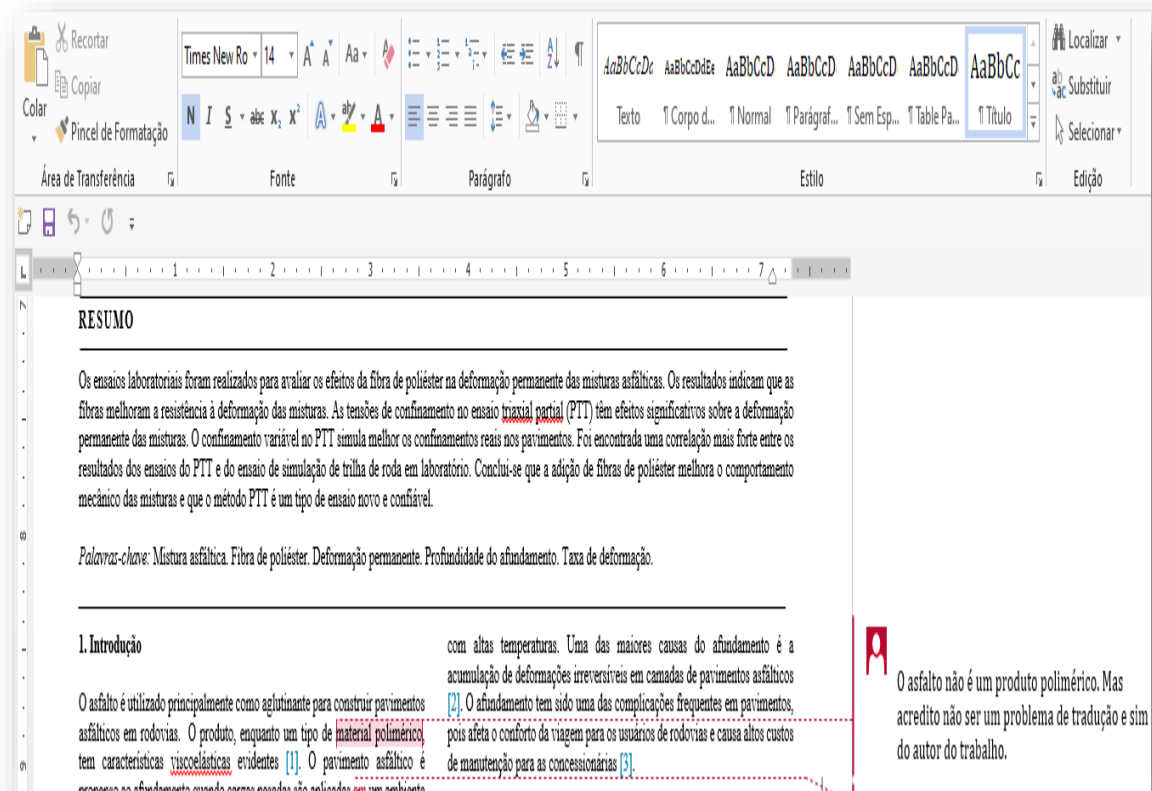
The commissioned text was from the Civil Engineering domain and revolved around asphalt pathologies. It was titled “Evaluation of permanent deformation of asphalt mixtures using different laboratory performance tests” (Xu et al., 2014), which we translated into Brazilian Portuguese as “Avaliação da deformação permanente de misturas asfálticas usando diferentes ensaios laboratoriais”. As already mentioned, this text was commissioned by a specialist professor in the area of asphalt pathologies from UFU.

To talk about the fifth phase of the incorporation of translation technologies into the translator work and education, I will provide just one example of the translation of a sentence from Xu et al. (2014) that ended up serving the discussions in class and my own

questionings about the translator education. The sentence is: “Asphalt, as a kind of polymeric material, has obvious viscoelastic characteristics”, which we translated into Brazilian Portuguese as “O asfalto, como um tipo de material polimérico, tem características viscoelásticas evidentes”.

From the syntactic, semantic, terminological and even phonological points of view, our translation seemed satisfactory, at least at a first glance. Nevertheless, after sending the translation for the Civil Engineering professor who commissioned it, we received the following comment in his final proofreading of our translation: “Asphalt is not a polymeric product. But I believe it is not a translation problem, but rather a problem of the authors of the text” (my own translation), as we can see it in Word dialog box on the right corner of the bottom of Figure 10.

Figure 10 – Revision of the Civil Engineering text



Source: the author’s archive.

In other words, the professor explained us that the Chinese researchers who wrote the original text were mistaken. Asphalt, the professor explained to us, is a substance extracted from bitumen, petroleum, or tar. It is a complex substance that has aggregate minerals that do not bind to each other as in traditional polymers, such as proteins, rubber, amongst others.

Backing to the MATECat system, for example, when we select the words “Asphalt” or “polymeric material”, and “ask” the Automatic AI assistant to give us any clarification on that fact, it displays the following message, as in Figure 11.

Figure 11 – Automatic AI Assistant response in MATECat for the words “Asphalt” or “polymeric material”

The screenshot shows the MATECat interface with the following elements:

- Header: "matecat by translated" logo, a document icon labeled "1 Engenharia\_2025", and a download icon.
- Navigation tabs: "Translation Matches (1)", "TM Search", "Glossary (1)", and "AI Assistant (x)".
- Section: "Meaning in context".
- Text: A detailed Portuguese explanation of asphalt, mentioning its viscoelastic properties, derivation from petroleum, and use in paving. It includes three numbered points: 1. "Asfalto" as a polymeric material with viscoelastic characteristics; 2. "Material Polimérico" as a material with a structure of long polymer chains; 3. "Características Viscoelásticas" as the ability to flow under stress and return to original form.
- Feedback: "Submit your feedback Was this suggestion useful?" with thumbs up and thumbs down icons.

Source: the author's archive.

One can see that the GenAI in MATECat repeats and reaffirms that asphalt refers to a polymeric material: “*No contexto fornecido, ‘asfalto’ refere-se a um material polimérico que possui características viscoelásticas evidentes...*”, which refers to the (mistaken) content: “In the provided context, ‘asphalt’ refers to a polymeric material that has obvious viscoelastic characteristics...”.

Even though Paes et al. (2024, p. 293) explain us that GenAI, as the name goes, generates a text that is conditional to “what is in the text”, the old notion of GIGO (in reference to Garbage In, Garbage Out), usually related to machine translation results, remains valid (Esqueda, 2021).

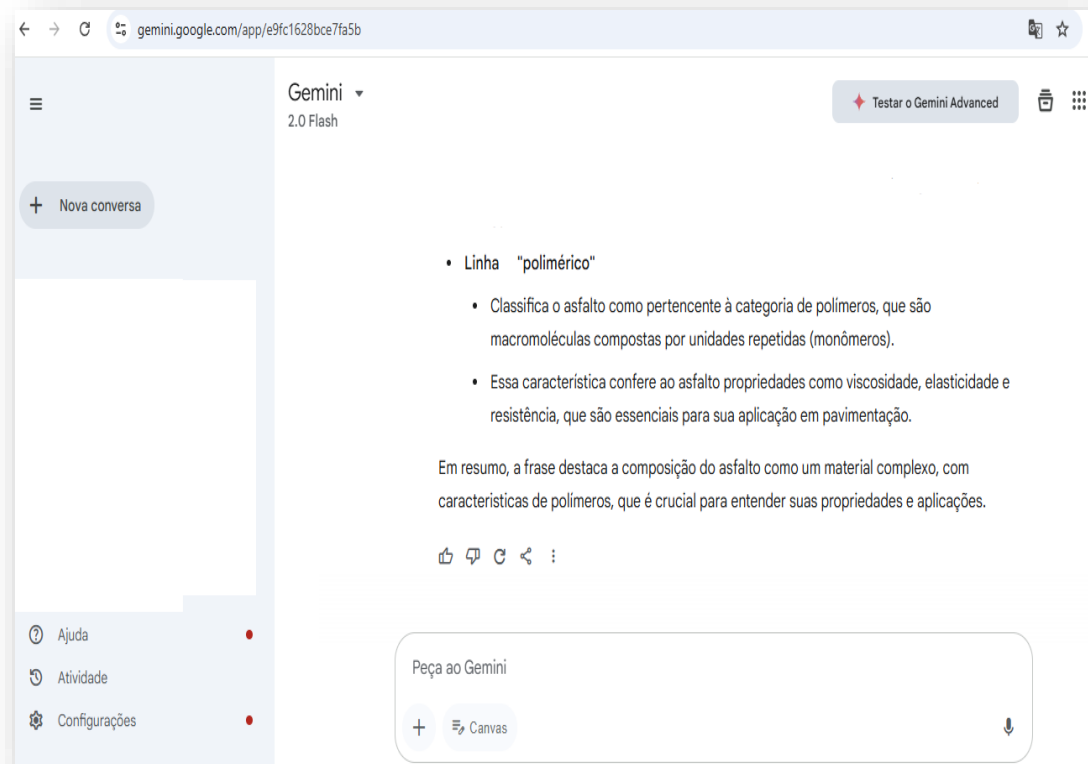
It must be highlighted that this assistant is coupled to the MATECat Translation Memory System. We did not elaborate prompts<sup>3</sup> for any other GenAI assistant to resolve the case “out of the CAT tool” in that occasion. But, for the sake of illustration in this essay, I elaborated a prompt of the type “zero-shot”<sup>4</sup>, that is, a very simple task, for Gemini GenAI (see Figure 12), such as “Analyze the sentence: asphalt is a polymeric material”. The answer was that asphalt belongs to the category of polymers, which we learned from the Civil Engineering professor at UFU that this is not an adequate idea.

Figure 12: Gemini GenAI output on the analysis of the sentence “asphalt is a polymeric material”

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<sup>3</sup> According to Paes et al. (2024, p. 393), a prompt is a text in natural language (as opposed to programming language) that specifies an instruction on what to be done. A prompt can be formulated as a question, a remark, a questioning, or even a specific task (e.g., classifying texts). Prompts can have a free format, but language models are very sensitive to their textual content. Ultimately, models like GPT function by completing text based on the provided prompt.

<sup>4</sup> To refer to different configurations of prompts, i.e. zero-shot, one-shot or few-shot prompts, please see Paes et al. (2024, p. 365-412).

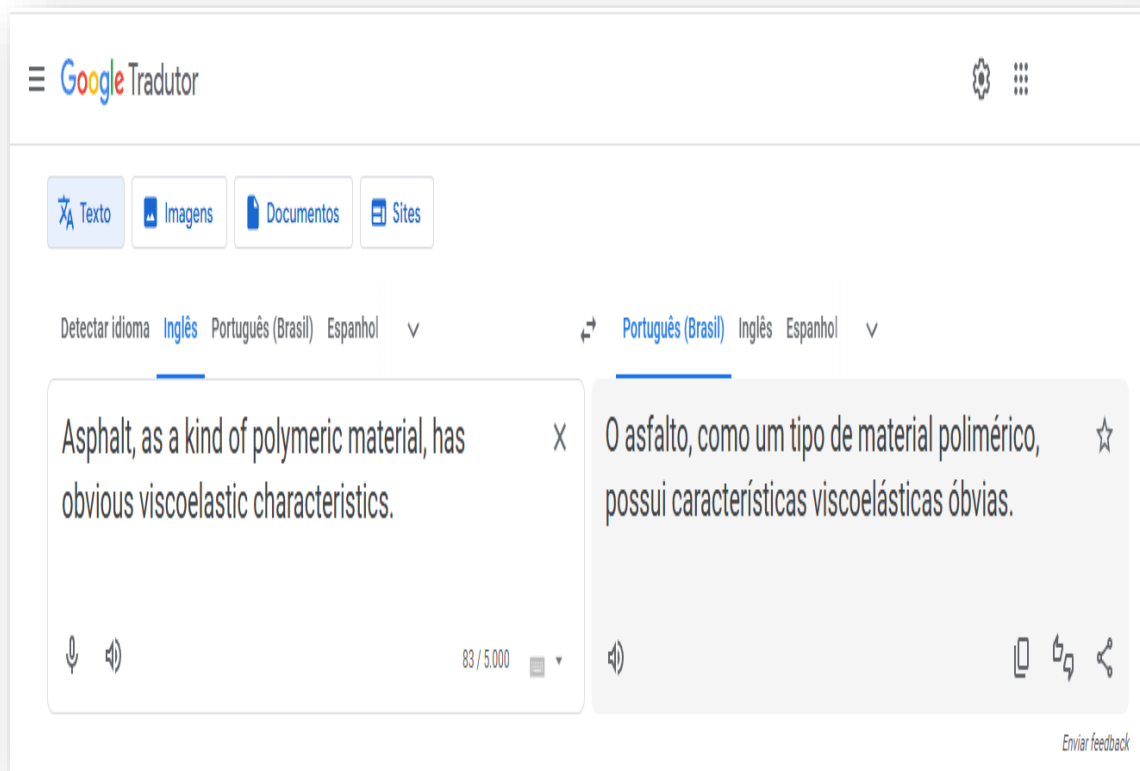


Source: the author's archives.

ChatGPT, on the other hand, generates the following ideas to the same prompt: "The sentence asphalt 'is a polymeric material' is not accurate. Conventional asphalt is a binder obtained from petroleum distillation, composed of a complex mixture of hydrocarbons, including saturates, aromatics, resins, etc." Although it exhibits that the sentence is inaccurate, the Civil Engineering professor says asphalt is not exactly a binder either.

On its part, Google Translate is even more ineffective when translating the sentence, as we can see in Figure 13:

Figure 13: Google Translate output to the sentence "Asphalt, as a kind of polymeric material, has obvious viscoelastic characteristics"



Source: the author's archive (March 26, 2025).

Well, one needs to be humble!

My students and I did not elaborate any prompt because we did not realize that the sentence was inadequate or even incorrect. We did not know that asphalt is not characterized as a polymeric product. This information was presented by the expert professor who collaborated with us during the proofreading process of the translated text. This expert, with over 30 years of experience in asphalt pathologies, was the one who alerted us. Moreover, in my view, we need to trust our experts, otherwise the very nature of science, institutions, and their stakeholders will not be trusted (Da Silva, 2019; Alves; Da Silva, 2024).

One may say we should teach machines, telling GenAI assistants that asphalt is not a polymeric product. However, as is the case with humans, other problems will probably arise and will demand other human actions, if we are even to perceive them.

The point is not that the pool of problem is infinite for the machine. So it is for humans. The point is that language is inherently human, context-dependent, culturally-bound, and so on.

Backing to our Civil Engineering translation project, to resolve the issue we resorted to another important (and pretty older) technology available to translators, the footnote. We added the following information to the translated text, which will be read by future engineers at UFU or elsewhere: “Please, be aware to the fact that asphalt *may* not be a polymeric product”. This footnote, leveraging the modal verb “*may*”, offered crucial clarification without infringing on the original authors’ intent or compromising the source text’s integrity. By stating that “asphalt *may* not be a polymeric product”, we accurately reflected the expert’s nuance, acknowledging that some asphaltic mixtures indeed contain varying aggregators. This demonstrates a practical and ethically sound solution to a common translational dilemma.

It is at this moment that the production and construction of knowledge seem to come together in the pedagogical endeavor. Therefore, as far as I am concerned, we are much more in a paradigm of a “*collaborative and collective intelligence*” than of an “*artificial intelligence*”.

In my view, the phases of the incorporation of translation technologies need to be taught and learned by future translators. They need to understand the effects of technological incorporation on their work, so they may gradually perceive that such learning presupposes a humanistic, historical and cultural learning process. More experienced human professionals necessarily mediate the translator education, so the knowledge that is produced and constructed by translators becomes truly profound, relevant, historical, and cultural to humanity. Otherwise, we will be held hostage to technologies and companies that control the data. If – or rather when – we become vulnerable to data, we run the risk of no longer seeing what is true, what is false or what needs human intervention.

## Final remarks

Returning to my initial thesis, through which I began my essay, I reaffirm that amongst the varied translation technologies (in the plural) that serve our profession, we claim for a translator education (in the singular) in collaboration with other professionals, recovering the humanistic, historical and cultural endeavors (Da Silva, 2019; Alves; Da Silva, 2024).

As I aimed to demonstrate, the more automation there is, the greater the risks of precariousness for humans. This does not imply denying the existence of the available tools. They are part of society. Denying them would be to dismiss several social advances.

As far as I have been able to understand and perceive, the human nature, that is, the human translation, is not a given with technologies. Machine translation, CAT Tools, GenAI assistants are indifferent to humans. Technology companies invest in themselves, in their own data, not in the human translator, not in the student, and much less in the translation educators, who may see their work and effort collapse.

In my view, we still do not have a translation pedagogy that is robust enough to educate translators, and not only technologically speaking. Although it is urgent, only time will tell whether we are – or when we will be – in the fifth phase of the incorporation of translation technologies into the work and education of translators. Is it the collaborative and collective intelligence the key to educate translators and ensure the translator's role and status in the AI-driven or AI-based language industry?

Trying to end up my reflections here, and respond to the above, maybe we should ask ourselves: why should universities, institutions that educate people with their own affective, historical, cultural, social, and political knowledge, be subjected to external impositions?

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