(Re)defining machine translation literacy: from a competence-based to a process-based approach

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revista.tradumàtica
tecnologies de la traducció

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Abstract

In this paper, we redefine machine translation literacy using a process-based approach, in order for our new definition to be applicable in any professional context, both oral and written. We also highlight how we used this new definition for the creation of a training framework for machine translation literacy.

Keywords: MT literacy, machine translation literacy, AI literacy.

Resumen

En este artículo redefinimos la literacidad en traducción automática mediante un enfoque basado en procesos, con el fin de que sea aplicable en cualquier contexto profesional, tanto oral como escrito. Asimismo, se pone de relieve cómo hemos utilizado esta nueva definición para la creación de un marco de formación en literacidad en traducción automática.

Palabras clave: literacidad en TA, literacidad en traducción automática, posedición, literacidad en IA.

Resum

En aquest article redefinim la literacitat en traducció automàtica mitjançant un enfocament basat en processos, amb la finalitat que sigui aplicable en qualsevol context professional, tant oral com escrit. Tanmateix, es posa en relleu com hem utilitzat aquesta nova definició per a la creació d'un marc de formació en alfabetització en traducció automàtica.

Paraules clau: literacitat en TA, literacitat en traducció automàtica, literacitat en IA.

Rebuda: 26 de maig de 2025| Acceptació: 13 de novembre de 2025 | Publicació: 15 de desembre de 2025

1. Introduction

One prominent use of artificial intelligence (AI) in our technology-driven world is machine translation (MT), "the process by which a machine — usually in the form of a web interface, browser plugin or mobile phone app — translates a written or spoken text from one language into another without involvement of a human translator" (Bindels et al., 2024). As early as 2016, Google Translate alone was estimated to have over 500 million users, with approximately 100 billion words a day being translated across more than a hundred languages (Turovsky, 2016). By 2020, over a billion users were using MT apps, websites and plugins such as Google Translate, DeepL and Bing Microsoft Translator for a wide range of purposes and in a wide range of settings, both informal and formal, professional and private, in anything from low-risk to high-stakes communication (Nurminen, 2021; Vieira et al., 2020). After ChatGPT was launched in 2022, attention in both industry and academia quickly shifted to using general-purpose large language models (LLMs) such as ChatGPT (OpenAI), Claude (Anthropic) and Gemini (Google) for translation tasks, with studies investigating how 'traditional' neural machine translation (NMT) and LLM-translation compare in terms of overall quality and types of errors made (Kocmi et al., 2024; Kornacki & Pietrzak, 2025).

Whereas MT technologies were once primarily used by professional translators, they are now increasingly integrated into the daily workflows of professionals in a wide range of fields and industries (Bindels et al., 2024). For example, patent professionals use MT to get the gist of patent documents published in foreign languages (Nurminen, 2019), and health professionals have conversations with patients who speak another language via translation apps on their mobile phones (Valdez & Guerberof-Arenas, 2025). For professionals without any formal training in translation, it is convenient and practical to resort to MT when they need to overcome language barriers, especially with prompt-based translation via apps that allow users to simply ask the tool to do what they want it to do. However, because many professionals have not been instructed on how to use such technologies effectively and responsibly, their use of MT carries significant professional and ethical risks (Bowker, 2020b; Killman, 2024; Rico & González Pastor, 2022; Vieira et al., 2022).

In order to promote effective and responsible use of MT in all its forms amongst all professional users, it is important that more attention is paid to MT literacy in study programmes that do not train translators or language specialists (Bowker, 2020b). Integrating MT literacy into language learning, as proposed by Pym & Hao (2024), is undoubtedly relevant and effective, but the reality is that for many future users of MT, language learning and using language technologies are not part of their professional training. In order to prepare nurses, doctors, lawyers, entrepreneurs, retailers, social workers, marketeers and other professionals for a future in which they will regularly use language and translation technologies, learning activities that promote MT literacy should be included in all regular training curricula, aligning with activities fostering information literacy, digital literacy and AI literacy (Dorst et al., 2025).

To achieve this ambition, educators in these different professional domains will first need to know what MT literacy is. Several scientific definitions of MT literacy have been proposed in recent years, but they often focus on a specific context or user group (e.g. translators, patent professionals, users in healthcare contexts) and primarily consist of lists of competences that users need to develop. Consequently, it remains an open question to what degree these definitions and the resulting competences are generalisable to other contexts involving professional or informal users. Therefore, the main goal of this article is to bring the existing definitions together and (re)define MT literacy from a process-based perspective in order for it to cover as wide a range as possible of contexts in which professionals may use MT, based on information about the way in which MT is currently being used in different professional domains. This definition then forms the basis for a reconceptualisation of MT literacy as an informed decision-making process and a framework educators can use to design contextually relevant learning activities which enable current and future professionals to build and strengthen their MT literacy.

Before presenting the definition and the framework, however, we first discuss the potential strengths and weaknesses of existing definitions of MT literacy.

2. Defining MT literacy

2.1 Existing definitions of MT literacy

Thanks to the pioneering work of Lynne Bowker, the notion of MT literacy is now well-established within the academic field of translation studies, and — to a lesser extent — within the translation industry. Bowker coined the term "machine translation literacy" in 2019 and continued to develop the concept and highlight its importance in higher education in a number of subsequent articles (Bowker, 2019a, 2019b, 2020a, 2020b, 2021).

Bowker & Ciro (2019) introduced a working definition for MT literacy in the context of scholarly communication, which is now the most frequently cited definition of the concept. They stated that it was "[...] through researching the concepts, talking to others, and experimenting with these ideas that we began to develop a better understanding of what is involved in machine translation literacy in the context of scholarly communication" (Bowker & Ciro, 2019: 87).

Their working definition, developed for the context of scholarly communication and introduced at the end of their influential work, is as follows and refers to the ability to:

- comprehend the basics of how machine translation systems process texts;
- understand how machine translation systems are or can be used (by oneself or by other scholars) to find, read, and/or produce scholarly publications;
- appreciate the wider implications associated with the use of machine translation;
- evaluate how (machine) translation friendly a scholarly text is;
- create or modify a scholarly text so that it could be translated more easily by a machine translation system; and

- modify the output of a machine translation system to improve its accuracy and readability.

(Bowker & Ciro, 2019: 88)

Subsequently, O'Brien & Ehrensberger-Dow (2020) further developed the concept from a cognitive perspective, focusing on the usage contexts of crisis communication, academic writing and patent publishing, summarising Bowker & Ciro's (2019) definition as follows: "Basically, MT literacy means knowing how MT works, how it can be useful in a particular context, and what the implications are of using MT for specific communicative needs" (O'Brien & Ehrensberger-Dow, 2020: 146).

Nurminen (2021), working with patent professionals, further refined the concept as a user's ability to:

1. Comprehend the basics of how machine translation systems process texts
2. Understand machine translation systems' strengths and weaknesses
3. Understand how machine translation systems are or can be used for purposes that are important to the user
4. Appreciate the wider implications associated with the use of MT
5. Assimilate information from raw machine-translated texts
6. Evaluate how machine translation-friendly a text is
7. Create or modify a text so that it can be translated more easily by an MT system
8. Modify the output of an MT system to improve its accuracy and readability

(Nurminen, 2021: 44)

More recently, Liu et al. (2022) introduced a working definition intended for educators and students in translation studies. According to them, MT literacy for translators encompasses the following competences:

1. Understanding the mechanism of different MT platforms;
2. Appreciating the broader implications of MT use;
3. Being able to critically evaluate MT-translated outputs;
4. Being able to modify or pre-edit a text for different MT platforms to translate;
5. Being able to edit MT outputs to improve accuracy and readability;
6. Knowing the advantages and limitations of MT;
7. Understanding how different MT platforms and other CAT tools complement each other.

(Liu et al., 2022: 19)

Liu et al. (2022: 19) note that this definition is "based on the survey and interview results" that they gathered, though it is not clear how they incorporated these results into their definition.

Similarly, Ehrensberger-Dow et al.'s (2023) survey amongst university students and researchers showed that many were interested in "learning more about how MT systems work" and "how to use MT systems effectively" (2023: 402), which made them "realise that there was a need for consulting services related to MT literacy that both translators and their trainers could be qualified to provide" (2023: 402). Ehrensberger-Dow et al.'s

proposed framework "explore[s] an extended concept of MT literacy adapted to their context and the role it can occupy in translators' competence profiles" (2023: 404) and identifies the following competences:

- basic knowledge about MT systems and how they differ from human intelligence
- knowing how to use MT (being aware of cognitive potentials and risks, developing strategies to foster one's own creativity, using the tool in a way that makes translators enjoy their work and maintains motivation)
- being an expert for translation among other experts (being able to talk to MT developers, having a clear self-concept)
- being an expert for the use of MT for clients, colleagues and society as a whole (being able to explain the potential and risks of MT to non-translators, acting as an MT consultant)
- being a change manager for digitalisation (taking the initiative to shape developments by providing input for workflows, being adaptive, promoting exchange among peers and building networks).

(Ehrensberger-Dow et al., 2023: 405)

Similar to Liu et al. (2022), this extended definition of MT literacy and the competences it involves focuses on professional translators. While it is based on the results of a large-scale questionnaire (over 6000 respondents), there is no explanation of how the answers provided by the researchers involved led to the formulation of these specific competences. Moreover, what all of these definitions have in common is that they are competence-based, revising and adding and deleting competences to and from the list in response to how the target group uses MT. The same is true for existing frameworks for data literacy and AI literacy (Krüger, 2022; Krüger & Hackenbuchner, 2022; Long & Magerko, 2020; Ng et al., 2021). Krüger & Hackenbuchner's (2022) framework for MT literacy identifies technical, linguistic, economic, societal and cognitive competences that professional translators need to develop and emphasises that data literacy has become central to MT literacy since "powerful AI technologies are permeating both the private and the professional spheres of modern societies and are increasingly influencing citizens' lives (often with an invisible hand)" (2022: 45). Focusing specifically on AI literacy, Long & Magerko (2020) identify no fewer than 17 competences, including "understanding machine learning" and "being aware of AI's strengths and weaknesses", for users to be able to "develop effective AI literacy interventions" (2020: 7). As Ng et al. (2021) point out, developing AI literacy is now a must for everyone, as people "live, learn and work in our digital world through AI-driven technologies" (2021: 2).

Although these definitions and the resulting lists of competences for different professional contexts are clear and convincing in their own right, and their flexibility can be considered a strength, one obvious drawback is the resulting need to adapt and update them to the user's specific context. This could lead to unnecessary reinventing of the wheel for a potentially infinite number of user scenarios. Also, these lists do not make it clear whether all competences are created equal, so to speak: are some competences 'obligatory' or minimally required while others are merely optional? Are

some competences more important than others (i.e. 'core' competences) and does this depend on the usage scenario or the definition? In addition, the lists give rise to the question of whether there is a 'threshold' for literacy: do users need to acquire all of the competences listed to be considered literate, or a minimum number (say, six of ten competences), or only the core competences? They also suggest that what counts as being MT literate in one scenario will not count as being MT literate in another. This potential lack of consistency and transparency makes such lists less manageable for educators. In our own reconceptualisation and redefinition of MT literacy, we have therefore moved away from specifying lists of competences involved in MT/AI literacy, focusing instead on identifying the different stages or phases all users go through as they decide whether or not to use MT and which type of MT to use, and connecting these phases to a didactic framework in which MT literacy is conceptualised as an informed decision-making process.

2.2 MT literacy for all types of professional users

As Bowker & Ciro's (2019) definition was specifically created for scholars, it focuses on activities related to the field of research, such as using MT responsibly for assimilation purposes, translation-friendly writing, or using MT as an assistant during the writing process. The same is true for Liu et al. (2022), Ehrensberger-Dow et al. (2023) and Krüger & Hackenbuchner (2022), all of which are focused on settings in which (future) professional translators make use of or advise on the use of MT. While a small but growing number of studies has looked at MT literacy for students in translation and/or language degrees (Bindels & Pluymaekers, 2022; Dorst et al., 2022; Loock & Léchauguette, 2021), very little attention has been paid to MT literacy for students in other disciplines, with the exception of Bowker's (2020) study on international business students. Interestingly, Loock & Léchauguette (2021) conclude that "students, even in their final year of an undergraduate programme in applied languages, fail to use MT tools effectively" and "[s]upplementary, specific training is therefore necessary for them to improve their MT literacy and their critical use of this technology later in the professional world" (2021: 214-15). They point out that for professionals who do not have a degree in languages or translation, it may be even harder to avoid being misled by the fluency of the translation, to evaluate the quality of the translation, and to identify and correct errors.

Research on how professionals other than translators use MT in their daily workflows remains rare (cf. Anazawa et al., 2013; Nurminen, 2019, 2021; Valdez & Guerberof-Arenas, 2025). Although most of the definitions discussed above contain elements that are arguably relevant to all types of users (for instance, appreciating the broader implications of MT use), they are primarily focused on target audiences that use MT to translate written texts, often in asynchronous contexts. However, many professional contexts in which MT may be used involve oral synchronous rather than written asynchronous communication — think of a lawyer or nurse talking to a client or patient — or involve texts that are disposable or dynamic rather than permanent and stable, such as an e-

mail or automated subtitling generated during an online meeting (see the use cases described by Valdez & Guerberof-Arenas, 2025). Moreover, professional users of MT will often not be able — or required — to evaluate the translation-friendliness of a written or spoken text or to revise and correct (i.e. post-edit) MT output.

Similarly, it can be argued that it is not always feasible or necessary for non-translators to "understand the mechanisms of different MT platforms" (as proposed in Liu et al.'s definition) or "comprehend the basics of how machine translation systems process texts" (as suggested by Bowker & Ciro) before they can use translation technology effectively and responsibly. Although in some circumstances such knowledge may be helpful for selecting the most appropriate translation tool for the communicative situation in hand, practical considerations like "Can the tool translate into the language the other person is speaking?", "Is this tool user-friendly?" and "Do the translations make sense to the other person?" are arguably more relevant for the average professional user. To use an analogy, mobile phone users do not need detailed insight into the technological mechanisms underlying GPS to be able to select their favourite navigation app.

In short, we argue that the existing definitions, given their focus on written texts and users with expertise in either translation or scholarly communication, may not cover the wide range of communicative contexts in which MT is used today. That is why we would like to accept Bowker and Ciro's (2019: 88) invitation for "feedback and suggestions for its refinement and improvement" by proposing a 'fit-for-all' redefinition of MT literacy in terms of an informed decision-making process.

As our main source of inspiration, we have used the description of common steps that professionals follow in deciding whether and how to use MT, as reported in Bindels et al. (2024). Below, we will explain in more detail how we translated this process model into a new definition of MT literacy and how we subsequently used this definition to create a didactic framework for training in MT literacy in higher education.

3. Common elements in the process of using MT

As mentioned in the introduction, an important objective of the project reported on in this paper was to design a didactic framework to help future professionals develop MT literacy through learning activities tailored to their respective professional contexts. To achieve this, the framework required a definition broad enough to apply across the targeted domains, while remaining flexible enough to include other professional domains.

In our previous work (Bindels et al., 2024), we established that professionals who use MT follow a decision-making process that includes a number of shared elements, regardless of the specific professional, linguistic or communicative context they find themselves in. We discovered this by first gathering a range of realistic use cases via an online survey and subsequently analysing a number of these cases in a focus group with experts in translation, translation technologies and intercultural communication.

These findings serve as the foundation for the definition and framework discussed in the present study. More information about the exact methodology can be found on pages 5-9 of Bindels et al. (2024).

The outcome of the analysis was the observation that professionals who use MT go through seven phases or steps, be it consciously or subconsciously. These phases and some of the considerations that are relevant in each phase are summarised below.

- Phase 1: Do I need a translation?
  Do I require a translation, or can I rely on an intermediary language? Alternatively, is my intended audience maybe already sufficiently familiar with the basics of the language I use?
- Phase 2: Which type of translation service do I need?
  Do I need a professional (e.g. a translator, interpreter), informal (e.g. a colleague who happens to speak the language) or automated solution (MT)? Multiple factors come into play here, such as the ability to check a given translation, time, the availability of the required language(s), money, privacy, and the complexity of a communicative situation.
- Phase 3: Which MT tool should I use in these specific circumstances?
  What tool is best for my specific situation? Is the required language combination or mode of communication (text-to-text, text-to-speech, speech-to-speech, etc.) available? How does the tool perform in a certain language? Does it cost money? How does the tool deal with privacy? How do the factors identified in phase 2 affect my choice of a specific MT tool?
- Phase 4: Which issues can I predict or prevent before the use of MT?
  Can I influence the quality of the MT output beforehand by, for instance, deleting superfluous terminology or adding contextual information in asynchronous communicative situations (written texts, video messages, etc.), as explained in the "ten guidelines for translation-friendly writing" mentioned by Bowker & Ciro (2019: 63-70)? In synchronous communicative situations (conversations, presentations, chat), can I prevent communicative issues by making certain arrangements beforehand?
- Phase 5: Which issues can I solve during the use of MT?
  In synchronous communicative situations, can I reduce the risk of potential translation issues during conversations due to the use of MT by, for instance, avoiding terminology and ambiguity, refraining from using complex cultural references or expressions, and providing the necessary context?
- Phase 6: Which issues can I solve after the use of MT?
  In asynchronous communicative situations, can I (or a professional) subsequently resolve issues resulting from the use of MT by, for instance, carefully correcting the output (post-editing)?
- Phase 7: To what extent did the use of MT impact the quality of communication?
  Was it cheaper to opt for MT? Was it faster? Did it cause any major issues in getting the message across to the target group? Was any privacy-sensitive information shared?

4. From a process description to a model of skilled performance

According to Hargie & Dickson (2004: 5), skilled performance in communicative situations is a process which involves:

- formulating goals and related action plans;
- implementing these plans;
- monitoring the effects of behaviour;
- adjusting, adapting, or abandoning goals and responses in the light of outcomes;
- taking cognisance of other people and the context in which interaction occurs.

For professionals using MT, the goal is to create a high-quality interaction with a person or a group of people who use a foreign language. When creating the action plan, the professional first needs to assess whether a translation is necessary to achieve a high-quality interaction (phase 1) and, if so, whether MT is a feasible option for generating that translation (phase 2). In short, the professional must be able to make an informed decision about whether or not to use MT.

Assuming that the action plan includes the use of MT, implementing this plan requires the professional to select the most appropriate MT tool given the communicative situation (phase 3) and, if applicable, take measures to prevent communication issues arising from suboptimal translations (phase 4). During the interaction, the professional will monitor the effects of using MT on the quality of the interaction and, if necessary, adjust, adapt, or abandon goals or responses to increase the likelihood that the communicative purpose of the interaction will be met (phases 5 and 6). In other words, the professional must be able to make an informed decision on how to use MT and anticipate and address issues caused by the use of MT.

Ideally, professionals who have used MT will also engage in a retrospective activity (phase 7) that involves reflecting on the different phases in the process and the decisions that were made during these phases. This will allow them to develop a critical attitude towards the scope for and pitfalls of using MT in particular contexts and to go through the process more effectively in future instances of MT use.

From this description of skilled performance, the following components of MT literacy can be derived: MT users must be able to (a) make informed decisions on whether and how to use MT, and (b) anticipate and address issues that can arise as a consequence of using MT. Furthermore, it is crucial that they do this in a critical manner in order to ensure that the use of MT serves not only their own needs, but also the needs of their interaction partners and society as a whole. This resonates with Bowker's (2020b: 28) assertion that "as a type of digital literacy, machine translation literacy is also chiefly a cognitive concern, rather than a techno-procedural one. Using machine translation is easy; using it critically requires some thought."

By combining these various elements, we arrive at the following definition: **MT literacy is the ability to make informed decisions on whether and how to use MT, and to anticipate and address issues caused by MT, in a critical manner.**

What sets this definition of MT literacy apart from some of the earlier definitions is its strong empirical foundation; it is directly derived from real-world use cases in a variety of professional domains. And while it derives directly from real-world professional use cases, it avoids the potential limitation of formulating context-specific or minimally required competences. As a result, users are not MT literate once they have acquired specific competences or a minimum number of competences, but once they make informed decisions. Perhaps more importantly, our proposed redefinition was specifically developed to serve as a foundation for a didactic framework that educators can use to develop contextually meaningful learning activities for future users of MT. In the next section, we describe how we used the different elements of our definition as building blocks for this framework.

5. A user-centred framework for training in MT literacy

As discussed in the introduction, we set out to enable educators in different professional domains to design contextually relevant learning activities that help future professionals in their domain develop their MT literacy. In order to do so, we have first created a definition that is based on a process description shared by MT users in different professional contexts. This definition serves as the baseline of our framework.

However, in order to make such a framework relatable to different groups of professional users and useful in educational settings, they should not only recognise these core elements but also be able to 'zoom in', as it were, and find inspiration and information that is relevant to their particular situations. That is why we opted for a visualisation of the framework as a 'sunburst', allowing users to navigate the different elements of the definition and find information and suggestions for learning activities that are particularly relevant to them, based on the use cases gathered in the survey.

The screenshot below (Figure 1) shows how we used the 'sunburst' visualisation to do this. For the online version, see procodiszuyd.eu.pythonanywhere.com/dashml/en. For each aspect of the definition, we provide users with relevant information, beginning with the concept of MT literacy and its significance for professional practice.

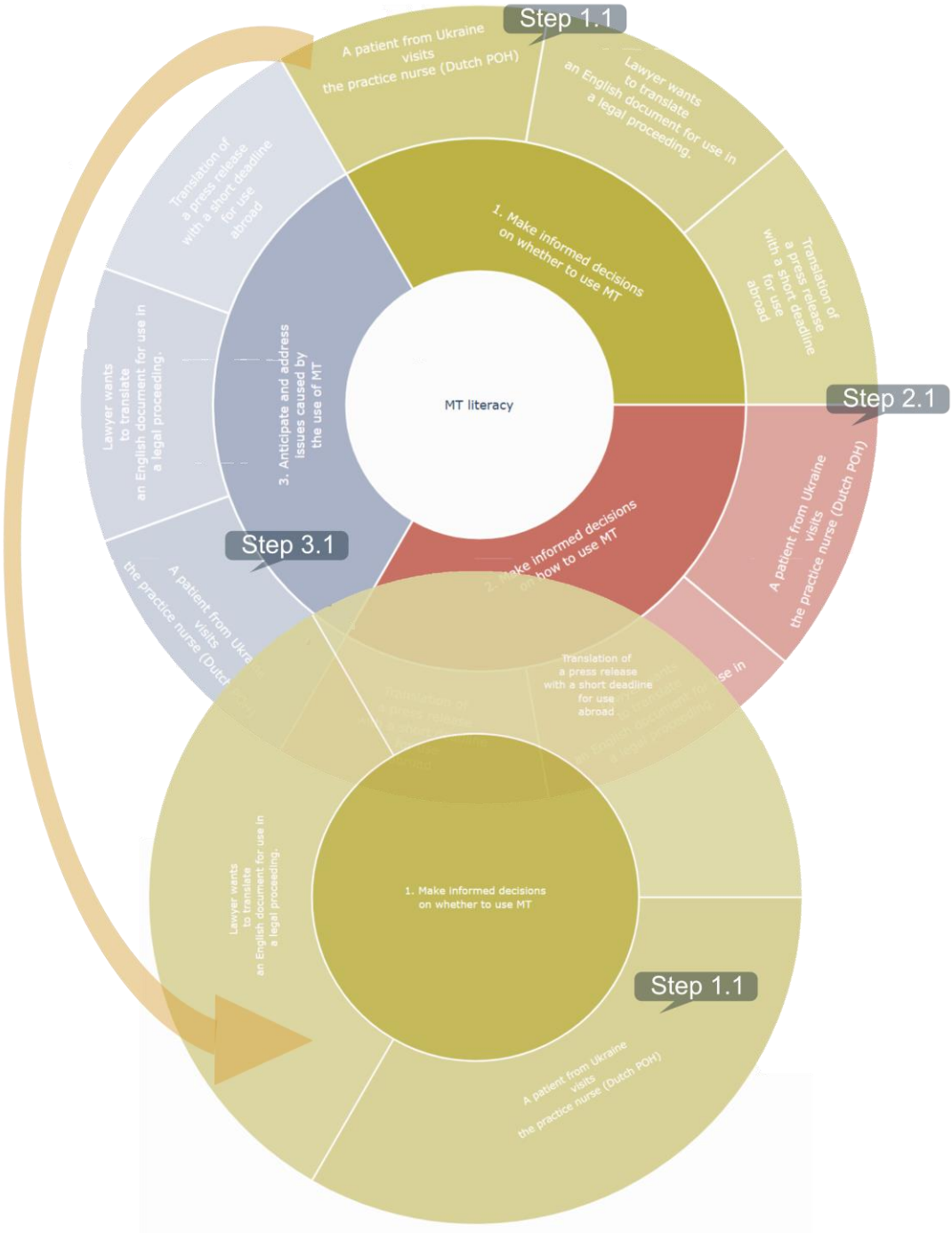

Figure 1: Didactic framework for training in MT literacy and detailed view of step 1.1

By clicking on one of the elements in the second layer — **making informed decisions on whether to use MT, making informed decisions on how to use MT**, and anticipating and addressing issues caused by MT — educators can find additional information about this particular aspect of the definition and relevant considerations that learners should be familiarised with. For example, in the sections about making informed decisions on whether and how to use MT, we delve deeper into various factors that come into play when professionals are faced with the choice between MT and alternative solutions (e.g. interpreters or semi-professional solutions), such as budget or time constraints and the

complexity of a communicative situation. These considerations are drawn from the results of the focus group reported on in Bindels et al. (2024).

In the third layer, we present typical communicative situations for three different professional contexts (a healthcare, a legal, and a communications setting), inspired by representative use cases (Bindels et al., 2024). At this stage, we also present various learning activities that help future professionals tackle challenges arising in those specific situations and, as such, support them in developing MT literacy in their respective contexts.

To illustrate how the framework can be used in practice, consider the case of a healthcare educator who wants to integrate AI translation tools into a workshop on multilingual patient communication. In this case, the framework can provide guidance at each step of the process. For example, when it comes to determining whether it is wise to use AI tools at all in such an oral situation, the educator could help students make informed decisions and consider the pros and cons by organising group discussions about relevant subjects raised in step 1.1 (see Figure 1 above). Possible subjects to discuss include privacy, ethical considerations and practical considerations, such as whether one is allowed to share personal information with third-party platforms, what the potential risks of miscommunication due to AI use are, and what advantages or disadvantages lie in alternative options in such a situation, thus helping students assess the potential risks associated with MT/AI usage, in line with the recent EU regulations on AI.

If the educator in question then wants to take things further and help students determine how to decide on an effective tool to use in a specific setting and properly prepare for its use, the educator can let students create a checklist specifically created for use in healthcare settings (step 2.1, Figure 1). Amongst other matters to consider, the checklist also helps students reflect on questions such as “Do I know which language my conversation partner speaks and which tool works best for that particular language combination?” and provides them with tips on how to make the best use of the tools.

If, finally, the educator wants to help students anticipate and address issued caused by MT in multilingual patient meetings, the educator will find relevant tips on how to help students prepare for such a situation, minimising the potential risk of miscommunication. It goes without saying that a good way for students to gain relevant experience is to allow them to actually undergo these situations. That is why we also offer tips on how to effectively organise simulated patient interviews (step 3.1, Figure 1).

By focusing on concrete use cases, the framework allows learners to develop MT literacy for the specific communicative situations in which they are most likely to need it. At the same time, the conceptual and didactic foundations are identical across different professional contexts. As a consequence, educators in other professional fields could add new use cases and corresponding learning activities to the framework while adhering to its basic structure.

6. Discussion

This paper took up Bowker & Ciro's invitation (2019) to refine and improve the current definition of MT literacy and to further investigate what such literacy entails for different users of MT. Previous definitions have tended to result in lists of competences that need to be mastered to become literate, such as "comprehend the basics of how machine translation systems process texts" (Bowker & Ciro, 2019: 88) or "Being able to modify or pre-edit a text for different MT platforms to translate" (Liu et al., 2022: 19).

Such lists are in line with traditional approaches to the definition of learning skills and objectives, classifying competences in terms of knowledge, skills and abilities (e.g. remember, understand, apply, analyse, evaluate, create — as proposed in Bloom's taxonomy (1956)). As the lists of competences cited in our review of existing definitions show, each new usage context results in the addition or deletion of specific competences based on the user's needs and goals (e.g. a doctor using MT to talk to a patient will not need to know how to post-edit output, and a patent lawyer using MT for gisting may not need to understand how the technology works). One major difference between these previous competence-based definitions and our own redefinition is that we have moved away from trying to formulate a comprehensive list of all the competences that would need to be mastered to become MT literate.

Rather than a competence-based approach, we propose a process-based definition that conceptualises MT literacy as an informed decision-making process and offers a framework for educators to design contextually relevant learning activities which enable current and future professionals to build and strengthen their MT literacy. The main advantage of our change of perspective — and the resulting redefinition — is that we need not add, delete, generalise, or specify competences to adjust the definition to a new (professional) context, say, a medical or a legal context versus using MT in academic research or for professional translation. One could argue that the seven identified phases are context-independent: anyone using MT in a professional context, in any given form (e.g. oral or written, synchronous or asynchronous) and for any given purpose, will need to go through these phases. Users can be considered MT literate when they go through each phase consciously and critically, asking the relevant questions and making informed decisions during each phase. However, we will explore this argument further in the final chapter, as we do need to add some caveats here.

From the description of recurring phases in the process of using MT (as reported in Bindels et al., 2024), we translated process description into a model of skilled performance, resulting in the redefinition of MT literacy as "the ability to make informed decisions on whether and how to use MT, and to anticipate and address issues caused by MT, in a critical manner". The potential strength of this definition and training framework lies in their broad applicability. The framework and the context-independent phases it was built on potentially apply to any professional communicative context, but the questions that people ask during each phase can be tailored according to the specific professional setting and according to whether it involves oral or written communication, whether the communication takes place synchronously or asynchronously,

what the purpose of using MT is, which financial, time or privacy constraints are in play, and how much knowledge the user has of the technology. Another strength is that the definition and framework are both grounded in real-world examples and can easily be adapted to cover a wider range of use cases without any need to alter the definition or the framework itself.

Finally, we feel that our definition and framework are, as far as we can see, relatively future-proof in terms of the type of technology that is used for MT. The launch of ChatGPT in 2022, and the resulting world-wide hype concerning using LLMs and GenAI for a variety of purposes, has had profound consequences for the translation industry. While conversational AIs such as ChatGPT, Claude and DeepSeek were not developed or trained specifically for the task of translation, both informal and professional users are already using the technology for exactly that purpose (Hendy et al., 2023; Kocmi et al., 2024).

We argue that, even with MT no longer being the exclusive domain of specific MT engines and rapidly becoming the domain of conversational AI tools, the above-described process and definition for using MT still holds. Yes, the widespread adoption of GenAI technologies means that users will need more data literacy and AI literacy, and as a result the specific questions that MT users should consider during the seven phases we identified will change, but the different phases and the main considerations that users go through stay the same, also in GenAI-based scenarios. For example, in phase 3 (Which MT tool should I use?) being literate would involve making an informed decision on whether to use a more traditional MT tool like Google Translate or a next-generation conversational AI; and in phase 4 (Which issues can I predict or prevent?), being literate would also involve understanding why GenAI-based translation leads to different kinds of errors and why it entails different benefits and risks.

7. Conclusion and future work

In this paper we have offered a process-based redefinition of MT literacy, resulting from real-world case studies involving professional users. Rather than defining MT literacy in terms of a list of competences, we conceptualise it as an informed decision-making process involving seven phases, summarised in three core elements that make up our definition. Our proposed framework illustrates how different training scenarios for specific types of users can be drawn up for the core elements of the definition and help professional users ask the right questions during each phase in their respective professional settings.

Of course, what professional (and informal) users actually do with MT 'in the wild' will undoubtedly keep changing and evolving, and empirical work will remain essential in keeping track of these developments. However, we feel confident that this will not make our proposed definition and framework obsolete. Rather, we invite scholars and professionals to keep adding examples of real-world applications and effective training

scenarios for educators to help users become critical, effective, and ethical users of MT in all its foreseen and as yet unforeseen forms.

We do need to mention some important caveats at this point: the process description and the resulting model of skilled performance, our redefinition of MT literacy, and, ultimately, the framework are mainly based on survey data explored in Bindels et al. (2024). As mentioned in that article, the focus on existing Dutch-speaking professional networks and the imbalance between different professional disciplines in the sample could mean that this research has overlooked relevant use cases from other, less-represented professional contexts.

On the other hand, the use cases that were used as input for the focus group represent a broad variety of professional contexts within that specific sample, ranging from oral to written situations, encompassing synchronous and asynchronous situations. Having said this, we do believe that the framework would gain value from examples and learning activities drawn from other sectors and that this would also help reach diverse groups of professional users and raise their awareness. This is why we welcome scholars and educators from different fields contributing additional cases to our collection.

Finally, the proposed definition could stimulate the development of other 'spin-off' tools to help professionals use MT critically and effectively in diverse settings. As such, we are currently developing a decision aid for MT use specifically aimed at professionals. This tool will mostly focus on the first two elements of our definition — making informed decisions on whether and how to use MT — and help potential MT users employ the technology more effectively by consciously focusing on the different factors that come into play in the decision-making process.

8. Acknowledgements

The project described in this paper was co-funded by Taalunie, the Union for the Dutch Language, which provided financial support for a project entitled 'Developing a Framework for Machine Translation Literacy in Higher Education'. The project members consisted of the authors of this article and the Representation in the Netherlands of the European Commission's Directorate-General for Translation.

Bibliography

Anazawa, Ryoko; Ishikawa, Hirono; Takahiro, Kiuchi (2013). Use of online machine translation for nursing literature: A questionnaire-based survey. *The Open Nursing Journal*, v. 7, pp. 22-28. <https://doi.org/10.2174/1874434601307010022>. [Accessed: 20251217].

Bindels, Joop; Dorst, Aletta G; Pluymaekers, Mark (2024). Machine Translation in the Workplace: Deciding on the Whether: Why and How. *Global Advances in Business*

Communication, v. 11, n. 1. <https://commons.emich.edu/gabc/vol11/iss1/4>. [Accessed: 20251217].

Bloom, Benjamin S; Engelhart, Max D; Furst, Edward J; Hill, Walker H; Krathwohl, David R. (1956). *Taxonomy of educational objectives: The classification of educational goals.* Handbook 1: Cognitive domain. New York: Longman.

Bowker, Lynne (2019a). Machine translation literacy as a social responsibility. *Proceedings of the Language Technologies for All (LT4All)*, pp. 104-107. <https://lt4all.elra.info/media/papers/O7/145.pdf>. [Accessed: 20251217].

Bowker, Lynne (2019b). Machine translation literacy: Academic libraries' role. *Proceedings of the Association for Information Science and Technology*, pp. 618-619. <https://asistdl.onlinelibrary.wiley.com/doi/epdf/10.1002/pra2.108>. [Accessed: 20251217].

Bowker, Lynne (2020a). Chinese speakers' use of machine translation as an aid for scholarly writing in English: a review of the literature and a report on a pilot workshop on machine translation literacy. *Asia Pacific Translation and Intercultural Studies*, v. 7, n. 3, pp. 288-298. <https://doi.org/10.1080/23306343.2020.1805843>. [Accessed: 20251217].

Bowker, Lynne (2020b). Machine translation literacy instruction for international business students and business English instructors. *Journal of Business and Finance Librarianship,* v. 25, pp. 25-43. <https://doi.org/10.1080/08963568.2020.1794739>. [Accessed: 20251217].

Bowker, Lynne (2021). Machine translation use outside the language industries: a comparison of five delivery formats for machine translation literacy instruction. *Proceedings of the Translation and Interpreting Technology Online Conference TRITON 2021*, pp. 25-36. <https://doi.org/10.26615/978-954-452-071-7_004>. [Accessed: 20251217].

Bowker, Lynne; Ciro, Jairo Buitrago (2019). *Machine translation and global research: Towards improved machine translation literacy in the scholarly community*. Bingley: Emerald Group Publishing.

Dorst, Aletta G; Salmi, Leena; Daems, Joke; Koponen, Maarit (2025). Machine Translation Literacy in the age of GenAI. *Proceedings of Translating and the Computer 46,* pp. 61-77. <https://www.tradulex.com/varia/TC46-luxembourg2024.pdf#page=61>. [Accessed: 20251217].

Dorst, Aletta G.; Valdez, Susana; Bouman, Heather (2022). Machine translation in the multilingual classroom. *Translation and Translanguaging in Multilingual Contexts*, v. 8, n. 1, pp. 49-66. <https://doi.org/10.1075/ttmc.00080.dor>. [Accessed: 20251217].

Ehrensberger-Dow, Maureen; Delorme Benites, Alice; Lehr, Caroline (2023). A new role for translators and trainers: MT literacy consultants. *The Interpreter and Translator Trainer*, v. 17, n. 3, pp. 393-411. <https://doi.org/10.1080/1750399x.2023.2237328>.

[Accessed: 20251217]. Hargie, Owen; Dickson, John. (2004). *Skilled interpersonal communication: Research theory and practice.* 4th ed. New York: Routledge.<https://doi.org/10.4324/9781003182269>. [Accessed: 20251217].

Hendy, Amr; Abdelrehim, Mohamed; Sharaf, Amr; Raunak, Vikas; Gabr, Mohamed; Matsushita, Hitokazu; Kim, Young Jin; Afify, Mohamed; Awadalla, Hany Hassan (2023). *How good are gpt models at machine translation? a comprehensive evaluation.* <arXiv preprint arXiv:2302.09210>. [Accessed: 20251217].

Killman, Jeffrey (2024). Machine translation literacy in the legal translation context: a SWOT analysis perspective. *The Interpreter and Translator Trainer*, v. 18, n. 2, pp. 271-289. <https://doi.org/10.1080/1750399X.2024.2344282>. [Accessed: 20251217].

Kocmi, Tom; Zouhar, Vilém; Avramidis, Eleftherios; Grundkiewicz, Roman; Karpinska, Marzena; Popović, Maja; Sachan, Mrinmaya; Shmatova, Mariya (2024). *Error span annotation: A balanced approach for human evaluation of machine translation*. <arXiv preprint arXiv:2406.11580>. [Accessed: 20251217].

Kornacki, Michał; Pietrzak, Paulina. (2024). *Hybrid workflows in translation: Integrating GenAI into translator training*. New York: Routledge.

Krüger, Ralph (2022). Integrating professional machine translation literacy and data literacy. *Lebende Sprachen,* v. 67, n. 2, pp. 247-282.

Krüger, Ralph; Hackenbuchner, Janiça (2022). Outline of a didactic framework for combined data literacy and machine translation literacy teaching. *Current Trends in Translation Teaching and Learning E*, v. 9, pp. 375-432.

Liu, Kanglong; Kwok, Ho Ling; Liu, Jianwen; Cheung, Andrew K. F. (2022). Sustainability and Influence of Machine Translation: Perceptions and Attitudes of Translation Instructors and Learners in Hong Kong. *Sustainability,* v. 14, n. 11. <https://doi.org/10.3390/su14116399>. [Accessed: 20251217].

Long, Duri; Magerko, Brian. (2020). What is AI literacy? Competencies and design considerations. *Proceedings of the 2020 CHI conference on human factors in computing systems*, pp. 1-16.

Loock, Rudy; Léchauguette, Sophie (2021). Machine translation literacy and undergraduate students in applied languages: report on an exploratory study. *Revista Tradumàtica, tecnologies de la traducció,* n. 19, pp. 21. <https://doi.org/10.5565/rev/tradumatica.281>. [Accessed: 20251217].

Ng, Davy Tsz Kit; Leung, Jac Ka Lok; Chu, Samuel Kai Wah; Qiao, Maggie Shen (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, v. 2. <https://www.sciencedirect.com/science/article/pii/S2666920X21000357>. [Accessed: 20251217].

Nurminen, Mary (2019). Decision-making, Risk, and Gist Machine Translation in the Work of Patent Professionals. *The 8th Workshop on Patent and Scientific Literature Translation*, *Dublin, August 20*, pp. 32-42.

Nurminen, Mary (2021). *Investigating the Influence of Context in the Use and Reception of Raw Machine Translation* [Doctoral dissertation]. Tampere University. Tampere. <https://urn.fi/URN:ISBN:978-952-03-2199-4>. [Accessed: 20251217].

O'Brien, Sharon; Ehrensberger-Dow, Maureen (2020). MT Literacy: A cognitive view. *Translation, Cognition & Behavior,* v. 3, pp. 145-164. <https://doi.org/https://doi.org/10.1075/tcb.00038.obr>. [Accessed: 20251217].

Pym, Anthony; Hao, Yu (2024). *How to Augment Language Skills: Generative AI and Machine Translation in Language Learning and Translator Training*. London [etc.]: Taylor & Francis. <https://doi.org/https://doi.org/10.4324/9781032648033>. [Accessed: 20251217].

Rico, Celia; González Pastor, Diana (2022). The role of machine translation in translation education: A thematic analysis of translator educators' beliefs. T*he International Journal of Translation and Interpreting Researc*h, v. 14, n. 1. <https://doi.org/10.12807/ti.114201.2022.a010>. [Accessed: 20251217].

Turovsky, Barak (2016, 11-11). *Ten years of Google Translate.* <https://blog.google/products/translate/ten-years-of-google-translate>. [Accessed: 20251217].

Valdez, Susana; Guerberof-Arenas, Ana (2025). "Google Translate is our best friend here": A vignette-based interview study on machine translation use for health communication. *Translation Spaces.* <https://doi.org/https://doi.org/10.1075/ts.24040.val>. [Accessed: 20251217].

Vieira, Lucas Nunes; O'Hagan, Minako; O'Sullivan, Carol (2020). Understanding the societal impacts of machine translation: a critical review of the literature on medical and legal use cases. *Information, Communication & Society*, v. 24, n. 11, pp. 1515-1532. <https://doi.org/10.1080/1369118x.2020.1776370>. [Accessed: 20251217].

Vieira, Lucas Nunes; O'Sullivan, Carol; Zhang, Xiaochun; O'Hagan, Minako (2022). Machine translation in society: insights from UK users. *Language Resources and Evaluation,* v. 57, pp. 893-914. <https://doi.org/10.1007/s10579-022-09589-1>. [Accessed: 20251217].