AI LITERACY AS A CORE COMPETENCE IN THE AGE OF HUMAN- COMPUTER INTERACTION: THE CASE OF TRANSLATION STUDIES

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Abstract

The rapid proliferation of Artificial Intelligence (AI) across various sectors necessitates a re-evaluation of user competences, particularly in fields undergoing significant technological disruption like Translation Studies. This study aims to map the landscape of AI literacy research to identify the gaps between technological adoption and critical user understanding. Employing a hybrid methodological approach, the research combines computational text-mining via Google LangExtract with qualitative thematic analysis of literature indexed in the Web of Science database. The analysis of 3,614 extracted concepts reveals a landscape currently dominated by 'Practice' (54.8%), followed by 'Tension' (28.2%) and 'Definition' (16.9%). These findings indicate a tool-rich but theory-poor environment where technical efficiency often overshadows critical reflection and ethical awareness. In the context of translation, this asymmetry manifests as a pressure to master Machine Translation Post-Editing (MTPE) workflows without a corresponding depth in critical machine translation literacy. The study concludes that AI literacy must evolve from passive technical proficiency to critical co-creation. Last but not least, the study calls for pedagogical frameworks that prioritize ethical agency and a human-in-the-loop approach to foster effective and responsible human-computer interaction.

Keywords: AI Literacy, Translation Studies, Human-Computer Interaction, Machine Translation Literacy, Digital Competence.

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İNSAN-BİLGİSAYAR ETKİLEŞİMİ ÇAĞINDA TEMEL BİR YETKİNLİK OLARAK YAPAY ZEKÂ OKURYAZARLIĞI: ÇEVİRİBİLİM ÖRNEĞİ

Öz

Yapay Zekânın (YZ) çeşitli sektörlerdeki hızlı yayılımı, özellikle Çeviribilim gibi teknolojik kırılmaların yoğun olarak yaşandığı alanlarda kullanıcı yetkinliklerinin yeniden değerlendirilmesini zorunlu kılmaktadır. Bu çalışma, teknolojik benimseme ile eleştirel kullanıcı anlayışı arasındaki boşlukları belirlemek amacıyla YZ okuryazarlığı araştırmalarının mevcut durumunu haritalandırmayı amaçlamaktadır. Çalışmada, Web of Science veri tabanındaki literatür üzerinde Google LangExtract aracıyla yapılan hesaplamalı metin madenciliği ile nitel tematik analizi birleştiren karma bir yöntem kullanılmıştır. Çıkarılan 3.614 kavramın analizi, alanın hâlihazırda 'Uygulama' (%54,8) kategorisi tarafından domine edildiğini, bunu 'Gerilim' (%28,2) ve 'Tanım' (%16,9) kategorilerinin izlediğini ortaya koymuştur. Bu bulgular, teknik verimliliğin sıklıkla eleştirel düşünme ve etik farkındalığı gölgede bıraktığına, araç açısından zengin ancak kuram açısından zayıf bir manzara oluşturduğuna işaret etmektedir. Çeviri bağlamında bu asimetri, eleştirel makine çevirisi okuryazarlığında derinleşme olmaksızın, Makine Çevirisi Sonrası Düzenleme iş akışlarına hâkim olma baskısı olarak tezahür etmektedir. Çalışma, YZ okuryazarlığının pasif teknik yeterlilikten eleştirel bir ortak yaratım sürecine evrilmesi gerektiği sonucuna varmaktadır. Son olarak çalışmada, etkili ve sorumlu bir insan-bilgisayar etkileşimi için etik failliği ve insan döngüde yaklaşımını önceleyen öğretimsel çerçevelerin gerekliliği vurgulanmaktadır.

Anahtar Kelimeler: Yapay Zekâ Okuryazarlığı, Çeviribilim, İnsan-Bilgisayar Etkileşimi, Makine Çevirisi Okuryazarlığı, Dijital Yetkinlik.

Introduction

Artificial intelligence (AI) is no longer confined to technical specialists and has become a pervasive force transforming how individuals live, work, and learn (World Economic Forum, 2022). From personalized content recommendations to decision-support systems in healthcare, AI technologies are increasingly embedded in everyday life. Nevertheless, this rapid diffusion of AI across sectors has outpaced public understanding of how these systems function and influence society (UNESCO, 2022). In other words, AI applications are widely used but many individuals lack the literacy necessary to engage with them critically and responsibly.

The concept of AI literacy has therefore emerged as a response to the gap between innovation and education. AI literacy can be broadly defined as the knowledge, skills, and attitudes required to comprehend, evaluate, and ethically interact with AI systems (Long & Magerko, 2020; Ng, Leung, & Chu, 2021). Scholars and policymakers alike emphasize that AI literacy is not reserved for computer scientists or engineers but represents a foundational competence for informed digital citizenship in the 21st century (Shute, Sun, & Asbell-Clarke, 2023; UNESCO, 2022). Developing AI literacy across populations is essential to enable informed decision-making, ethical awareness, and meaningful participation in an increasingly AI-driven world (OECD, 2023).

Despite its importance, AI literacy remains an evolving and inconsistently defined concept. AI literacy was attributed to simply understanding basic AI concepts or using AI tools in early definitions (Center for Innovation in Digital Learning [CIDDL], 2023). Recent scholarship has broadened the scope of AI literacy beyond mere technical proficiency. It is emphasized that being AI-literate calls for the capacity for critical reflection, ethical judgment, and awareness of AI's social impact (Long & Magerko, 2020; Shute, Sun, & Asbell-Clarke, 2023; UNESCO, 2022).

With a multidimensional understanding, it is emphasized that genuine AI literacy combines cognitive and technical skills with ethical and socio-emotional competencies. However, a gap still remains between the widespread adoption of AI technologies and users' comprehension of their mechanisms and implications (OECD, 2023; Miao & Holmes, 2023). Educational systems have recently begun to integrate AI-related curricula, while professional training often trails behind the rapid technological changes in workplaces (Laupichler et al., 2023).

Empirical evidence underscores a certain scope of discrepancy. Surveys indicate that nearly half of Generation-Z learners struggle to evaluate AI outputs or identify the limitations of AI systems, which reflects the inadequacy of current AI literacy education (Ng, Leung, & Chu, 2021; World Economic Forum, 2022). Such findings suggest that while digital familiarity is high, critical AI understanding remains shallow when it comes to issues of bias, transparency, and ethical responsibility. Policymakers have begun to acknowledge this literacy gap. For example, the European Union's draft Artificial Intelligence Act explicitly mandates that users of AI systems including educators and students must possess a sufficient level of AI literacy to ensure safe and informed interaction with AI technologies (European Commission, 2023).

The present study aims to map the landscape of AI literacy research and practice over the last decade, highlighting the existing frameworks and definitions, and identifying challenges and gaps that impede the development of AI literacy. A special focus is spared for translation and language-related professions as a case study of an industry undergoing AI-driven change, where practitioners are increasingly expected to work alongside AI without always having formal training in AI. Through a thematic synthesis of the literature from 2024–2025, key themes are addressed such as the disconnect between knowledge and practice, ethical and bias considerations, equity and access issues, and disciplinary differences in how AI literacy is approached. Finally, pedagogical implications are suggested for educators and trainers. The authors also argue for treating AI literacy as a core competency necessary for ethical agency and effective human-AI collaboration.

Definitions of AI Literacy

The concept of AI literacy has evolved notably as scholars from diverse fields have contributed their perspectives. In education, it extends from digital literacy and computational thinking, emphasizing the ability to understand, interact with, and assess AI systems (Long & Magerko, 2020; Ng et al., 2021). Kandlhofer et al. (2016) were among the first to define AI literacy as the competencies that allow individuals to comprehend and use AI technologies, focusing mainly on conceptual and technical understanding. As for Translation Studies scholars argue for a specific machine translation (MT) literacy which is defined as the ability to comprehend how MT systems process language and to critically evaluate their output rather than accepting it blindly (Bowker & Buitrago Ciro, 2019). Later, Long and Magerko (2020) expanded this view by including the capacity to critically evaluate AI, communicate and collaborate with it, and use AI meaningfully in everyday contexts.

Recent literature treats AI literacy as a multidimensional construct encompassing cognitive, technical, ethical, and socio-emotional components (Shute, Sun, & Asbell-Clarke, 2023; UNESCO, 2022). The cognitive aspect covers understanding core AI concepts and recognizing

the usage areas and limitations. The technical side refers to applying or even creating simple AI tools appropriate to one's field. The ethical dimension focuses on awareness of issues such as bias, transparency, privacy, and accountability (Miao & Holmes, 2023). Finally, the socio-emotional element relates to one's attitudes and confidence toward AI being open-minded yet critical when engaging with intelligent systems (OECD, 2023).

Ng et al. (2021) proposed a four-part framework that captures these dimensions: knowing and understanding AI, using and applying AI, evaluating and creating AI, and considering AI ethics. Their model highlights empowerment and critical engagement rather than passive consumption of AI technologies. From a Social Science perspective, AI literacy also supports informed citizenship, helping individuals make conscious choices about where and how they use AI (UNESCO, 2022). Policy-oriented definitions reinforce this holistic approach. UNESCO's (Miao & Holmes, 2023) framework, for example, distinguishes between learning about AI and living with AI. Therefore, there emerges a link technical understanding with ethical coexistence. Similarly, the OECD (2023) views AI literacy as part of broader digital literacy, urging citizens to grasp both the potential and the limitations of AI.

From the Computer Science and Human Computer Interaction (HCI) perspective, scholars like Long and Magerko (2020) conceptualize AI literacy as the capacity to collaborate with intelligent systems and integrate AI as a partner in human tasks rather than merely as a tool. This approach extends computational thinking by emphasizing co-working with AI to solve problems. Other researchers position AI literacy in relation to established literacies such as data, information, and digital literacy (Ng et al., 2021; Shute, Sun, & Asbell-Clarke, 2023). For example, data literacy which is defined as the ability to interpret and reason with data and digital literacy are often viewed as foundational skills upon which AI literacy is built. Yet, AI literacy goes beyond these by encompassing the interpretation of algorithmic decision-making, understanding the probabilistic nature of AI outputs, and evaluating their ethical and societal implications (UNESCO, 2022; OECD, 2023).

In conclusion, educators argue that fostering AI literacy allows individuals to engage with AI technologies effectively and responsibly. In practical terms, this means being able to identify when an AI system is in operation as well as comprehending the reasoning behind its outputs and then critically evaluate those outputs in order to exploit AI tools to augment rather than replace human capabilities (Long & Magerko, 2020). Frameworks such as UNESCO's AI Competency Framework for Students (2024) expand this view by framing AI literacy not just as user proficiency but as co-creative capacity. Human-centered mindsets, ethical reasoning, technical understanding, and design skills across progressive levels of understanding, applying, and creating are emphasized with this framework. Developing these competencies enables individuals to become co-creators with AI by working collaboratively with intelligent systems in ways that leverage their strengths while preserving human agency, values, and oversight (Long & Magerko, 2020; UNESCO, 2024).

Methodology

In the study, comprehensive searches in a major scholarly database of Web of Science were conducted. Core search terms included "AI literacy", "artificial intelligence and literacy or competency", as well as field-specific queries such as "AI literacy in translation" and "machine

translation literacy". To ensure the inclusion of broader strategic and policy-oriented perspectives, influential framework documents from UNESCO, OECD, and the World Economic Forum were also reviewed. Given the interdisciplinary nature of AI literacy; literature from education, computer science particularly HCI and AI education, information science, and the social sciences were not excluded from the search results.

Given the extensive scope of the literature corpus, the authors adopted a hybrid analytical procedure combining computational text-mining with inductive qualitative thematic analysis. First, the abstracts of the retrieved publications were processed using a text-mining tool, Google LangExtract, to detect recurring lexical patterns and clusters of concepts such as AI literacy and translation competence. Second, the automated outputs generated through this process were used to inform a subsequent phase of manual thematic coding, during which the conceptual dimensions of AI literacy including cognitive, technical, ethical, and socio-emotional components as well as emergent themes were iteratively refined. This dual-method approach enhances both efficiency and rigor by enabling broad corpus scanning while preserving researcher reflexivity.

The text-mining process resulted in a dataset of 3,614 coded concepts, which were subsequently categorized into 'Practice', 'Tension', and 'Definition' to allow quantitative assessment of the field's focus. Through iterative reading and theme construction supported by the extracted lexical patterns, we identified several overarching thematic trajectories and conceptual tensions across the literature. These include discrepancies between conceptual definitions and actual pedagogical or professional practice, increased attention to ethics and algorithmic bias, the role of equity and access in shaping AI literacy development, and variation across disciplinary and professional contexts. A focused examination of research in translation and language service professions was conducted to illustrate how AI literacy is negotiated within a specific domain of professional practice.

Findings

The analysis of the corpus yielded 3,614 distinct extractable concepts related to AI literacy. These concepts were coded into three primary categories. The categories are related to practices, tensions, and definitions respectively. The distribution of these concepts reveals a field that is currently predominantly action-oriented, with practice accounting for more than half of the extracted data (n = 1,982, 54.8%). Tensions represented the second largest category (n = 1,020, 28.2%), indicating significant friction in the adoption and understanding of AI tools. Definitions were the least frequent category (n = 612, 16.9%), suggesting that the literature may focus more on implementation and critique than on establishing a unified theoretical consensus.

Graph 1. Distribution of dimensions across categories
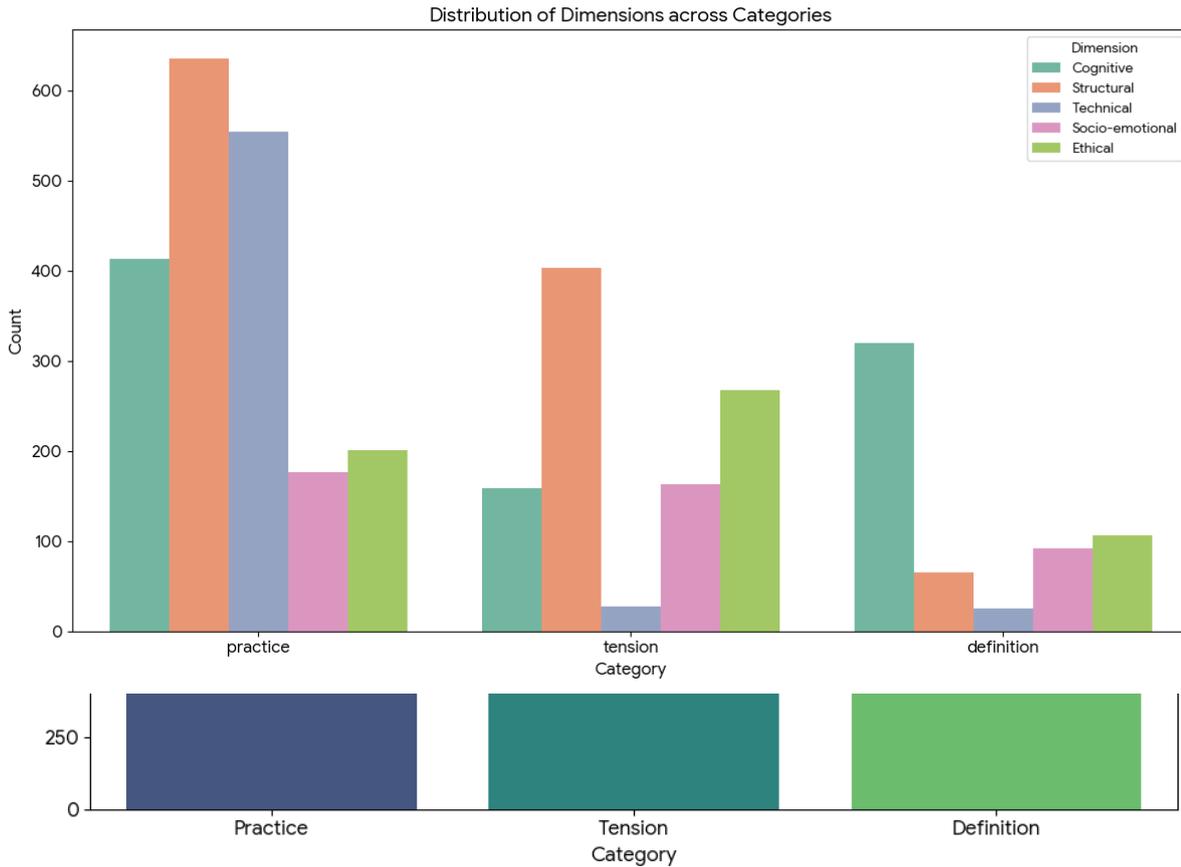
Distribution of AI Literacy concepts by category

Table 1 presents the frequency distribution of these categories alongside their primary dimensions.

Table 1: Frequency of AI Literacy Concepts by Category and Dominant Dimensions

Category	Frequency (n)	Percentage (%)	Top Associated Dimensions (Count)
Practice	1,982	54.8%	Structural (627), Technical (547), Cognitive (413)
Tension	1,020	28.2%	Structural (398), Ethical (263), Socio-emotional (162)
Definition	612	16.9%	Cognitive (315), Ethical (106)

Practices and the Operationalization of AI Literacy

The Practice category encompassed the diverse ways in which AI literacy is enacted, taught, and utilized. The analysis revealed that practices are heavily anchored in the structural (n=627) and technical (n=547) dimensions, reflecting a focus on institutional frameworks and tool proficiency.

Technical practices often focused on efficiency and specific tool application. The extracts highlighted the use of generative AI to streamline administrative tasks and the implementation of personalized learning pathways. In the context of Higher Education, which was the most prevalent field context (n=332), practices included the creation of specialized AI programs and smart labs designed to foster technical competency.

Pedagogical interventions were also prominent. Educators are reportedly employing metacognitive scaffolding and designing interventions to help students integrate AI literacy, technological innovation, and collaborative partnerships. These findings suggest that the practice of AI literacy is currently defined by a dual focus. The instrumental use of tools for efficiency and the structural redesign of educational environments are seen as reasons to accommodate these new technologies.

Tensions, Barriers and Ethical Conflicts

The tension category captured the challenges, risks, and anxieties associated with AI adoption. Unlike practices, which were technical and structural, tensions were significantly defined by ethical (n=263) and structural (n=398) concerns.

Ethical tensions frequently centered on academic integrity and the opacity of AI systems. The analysis identified concerns regarding the unsupervised use of AI tools, which stakeholders feared could compromise scientific integrity. Further ethical risks included the potential for automation to diverge from patient-centered care in medical contexts, and the rhetorical risks of using generative AI for sensitive communication.

Cognitive and socio-emotional tensions were also evident. Extracts pointed to cognitive debt and intellectual sedentarism as negative byproducts of over-reliance on AI. Furthermore, students and professionals alike expressed AI anxiety and a lack of confidence, with data noting that students are not confident in their skills for using AI appropriately. Structurally, the data revealed a recurring theme of inconsistent institutional commitment and a lack of comprehensive educator training, suggesting that the rapid pace of AI evolution is outstripping institutional capacity to support it.

Definitions and AI Literacy

The definition category provided insight into how the field conceptualizes AI literacy. This category was overwhelmingly cognitive (n=315) in nature. Definitions of AI literacy often moved beyond mere technical skill to include deep conceptual understanding. The data described AI literacy as requiring an understanding of predictive modeling and the ability to discern the probabilistic nature of AI-generated text. One conceptualization framed literacy as the alignment between a worker's abilities and their role, termed the role-ability fit. Interestingly, definitions also incorporated an affective component, with some sources defining engagement with AI as a deeply affective, entangled, and situated practice. This suggests that theoretical understandings of AI literacy are evolving to encompass not just what users know or do, but how they feel and relate to the technology.

Contextual Distribution

The analysis highlighted a stark concentration of AI literacy discourse within the education sector. The most frequently occurring context fields were Education (n=335), Higher Education (n=332), and Teacher Education (n=126). While niche contexts such as medical education and journalism appeared, the findings indicate that the current conceptualization of AI literacy is primarily being shaped by the needs and constraints of academic institutions.

Discussion

The findings of this study confirm the existence of a literacy gap, but they refine our understanding of where that gap lies. It is not merely a gap between having access to AI and knowing how to use it; on the contrary, it is a gap between the technical capability to operate tools and the ethical/cognitive capacity to evaluate them.

The dominance of the Practice category (54.8%) alongside the prominence of technical dimensions suggests that the current landscape is tool-rich but theory-poor. In the context of translation and language services, this finding manifests as a pressure to master Computer-Assisted Translation (CAT) tools and Machine Translation Post-Editing (MTPE) workflows. However, the relatively low frequency of definitions suggests that the industry is adopting these tools faster than it is defining the underlying competencies required to control them. As noted in the literature review, genuine AI literacy requires critical reflection (Long & Magerko, 2020); yet, our findings show that critical reflection is often overshadowed by efficiency in actual practice.

The significant presence of Ethical tensions (28.2%) highlights the risks of a purely technical approach to AI literacy. Ethical concerns extend beyond academic integrity to include issues of data privacy and the potential devaluation of human labor in MT workflows, as highlighted by Moorkens (2022). In language professions, where nuance and cultural context are paramount, the unsupervised use of AI, which is a theme identified in the findings, poses a direct threat to quality. If AI literacy is treated only as a technical skill, professionals may fail to recognize when the system hallucinates or biases a translation. Therefore, AI literacy in the translation sector can be reframed not just as a technical requirement for MTPE, but as a mechanism for ethical agency, thereby empowering translators to defend humans in the loop.

The finding that structural barriers are a primary source of tension implies that individual upskilling is insufficient. The data points to a lack of comprehensive educator training and institutional commitment. Ultimately, the goal of AI literacy in translation is to empower users to leverage technology effectively while maintaining human agency over the final text (Kenny, 2022). For translator training programs, this means that adding a single course on AI tools may be inadequate. Instead, curricula should bridge the gap identified in our analysis. It is important to connect the cognitive definitions with ethical tensions, before moving to technical practice. One final note is about the mismatch between the number in the table. As seen in the Table 1 top associated dimensions do not add up to frequencies, that is because there are other insignificant dimensions found by LangExtract tool. Such dimensions with low frequency was left out and the primary ones were included the author to avoid a possible over complexity of data shown in the table.

Conclusion

This study was methodologically grounded in an analysis of the literature indexed in the Web of Science database, combining LangExtract text analysis with qualitative thematic synthesis. By processing over 3,600 distinct concepts through a hybrid analytical procedure, we were able to objectively map the distribution of research focus across practice, tension, and definition categories. This approach allowed us to move beyond anecdotal observation and empirically demonstrate that the field is currently dominated by structural and technical concerns, while theoretical consensus and ethical definitions remain significantly underrepresented. The use of automated lexical pattern detection tool of LangExtract by Google ensured that the identified gaps particularly the disparity between rapid tool adoption and the lagging development of critical literacy are supported by evidence base from recent scholarship.

In the specific context of Translation Studies and language services, these findings reveal a significant competency asymmetry. Our analysis indicates that while the translation industry is aggressive in its adoption of AI-driven workflows such as MTPE, the corresponding frameworks for MT literacy are often reduced to mere technical proficiency when it comes to translation training. This point of view suggests that the current professional training models are prioritizing the efficiency of the tool over the agency of the translator, leaving practitioners vulnerable to the ethical pitfalls and biases that might emerge from generative AI models.

Consequently, the present study underscores that the literacy gap is not a lack of access to technology, but a deficit in critical understanding. As our findings suggest, the landscape is tool-rich but theory-poor. To bridge this gap effectively, we are supposed to move beyond training for passive consumption and toward fostering critical co-creation. Future translation curricula can prioritize the human-in-the-loop, equipping learners not just to operate CAT tools, but to evaluate AI outputs, challenge algorithmic biases, and collaborate with intelligent systems responsibly. By embedding these multidimensional competencies into professional training, we can empower individuals to navigate the age of human-computer interaction not as replaced observers, but as informed, ethical agents of change.

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