Translation Ergonomics
Toward a Sustainable Profession

Burcu TAŞKIN

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Preface

This book did not begin with a formal theory or a neatly defined research question. It emerged from a deeply felt, widespread discomfort experienced by many translators around me, as well as within myself. Long hours in front of computer screens, persistent neck and back pain, strained eyes, disrupted sleep, and a lingering mental fatigue were all too common among colleagues, students, and practitioners. These conditions prompted me to question why translation work is structured this way and what improvements could realistically be made within my role as an educator and researcher.

My initial approach to ergonomics was straightforward, focusing on practical interventions such as improving posture, utilizing ergonomic furniture, optimizing lighting, and managing cognitive load. Initially, these solutions appeared as valuable means of addressing daily discomforts, offering tangible relief and promoting more effective work practices among translators. However, as I delved deeper, it became clear that the issues facing translators went far beyond mere discomfort or inefficiency. Translators were grappling with structural problems such as economic instability, chronic underpayment, lack of recognition, and precarious working conditions. These were deeply entrenched systemic issues that undermined the very foundations of translator well-being.

This recognition led me to a critical turning point. Initially, I felt overwhelmed by the magnitude of these structural barriers. I am neither a policymaker nor an institutional decision-maker; I do not control market conditions or global translation practices. This awareness created a sense of helplessness, leading me to question the very purpose of studying ergonomics in a profession where economic instability and systemic undervaluation are so pervasive.

However, rather than becoming paralyzed by these limitations, I chose to reframe my role and my objectives. I realized that while I might not be able to resolve these systemic issues directly, I could still contribute meaningfully by making them more visible and sparking conversations that challenge existing assumptions. This new perspective led me to sustainability as an ecological concept and a broader ethical principle intertwined with professional survival and systemic change.

In exploring sustainability, my engagement expanded through insights provided by Crip Theory, Green Ergonomics, and Eco-Translation. These theoretical frameworks allowed me to understand the translator as a professional

embedded within complex ecological, technological, and institutional networks. They helped me recognize that improving translator well-being involves addressing larger environmental and ethical responsibilities. Translators' working conditions, tools, and professional practices are inherently connected to broader ecological and institutional dynamics, reinforcing the need for a holistic approach to translation ergonomics.

Throughout this intellectual journey, I also had to grapple openly with my own contradictions. I relied extensively on digital technologies, such as AI tools, grammar checkers, and research databases, which facilitated my academic productivity. However, this heavy use of technology simultaneously embodied the very pressures and ecological impacts I aimed to critique. Acknowledging and confronting this tension became an integral component of my work, reflecting a broader ethical consideration that underpins this book.

This book, therefore, is not a prescriptive manual or a fixed set of solutions. It is an exploration, a synthesis of empirical research, theoretical reflections, and institutional experiences. Crucially, this work contributes to Translation Studies by proposing an innovative, comprehensive framework that expands traditional textual and linguistic analyses to include embodied, cognitive, organizational, educational, and ecological dimensions. It encourages readers to reexamine translation ergonomics through these linked perspectives, inspiring critical thinking about the structures influencing translation practices today.

Ultimately, despite recognizing the limitations of my position, I wrote this book with a strong sense of scholarly responsibility. Although I cannot singlehandedly transform the professional landscape of translation, I hope to inspire awareness and stimulate dialogue among students, educators, translators, and policymakers about the importance of integrating sustainability into everyday translation practice. More than anything, this book is a call for collective reflection, deliberate care, and collaborative action toward creating more humane, inclusive, and sustainable conditions for translators everywhere.

Kırklareli, July 2025

Chapter 1

Introducing The Ergonomic Turn in Translation Studies

Translation has undergone significant changes in recent decades, evolving from a straightforward process of conveying meaning across languages to a complex, digitally driven, and highly interdisciplinary field. Today, translators work as specialized experts in a constantly evolving technological landscape, navigating various institutional settings and complex cognitive demands. As digital platforms, artificial intelligence, and global workflows become more important, translators often struggle with physical discomfort, mental overload, emotional burnout, and systemic pressures that impact their job performance and personal well-being. These current challenges have led to a shift in Translation Studies (TS) toward focusing on the human and environmental factors that affect translators' work.

According to the International Ergonomics Association[1], ergonomics is the scientific study of how humans interact with other elements of a system, using theory, principles, data, and methods to improve human well-being and overall system performance. This broad, interdisciplinary approach has also evolved over time, starting with industrial and human factors research that focused on physical environments in manual labor settings. Today, ergonomic principles address physical, cognitive, organizational, and ecological factors. As a result, ergonomics in TS looks beyond traditional concerns, such as workspace design and posture, to systematically examine and improve the overall environmental conditions in which translators work.

Defining Ergonomics

Ergonomics, also referred to as human factors and ergonomics (HFE), is a multidisciplinary field that studies the interaction between humans and the systems, technologies, environments, and organizational structures within which they work. At its core, ergonomics aims to design work systems, tools, and tasks that are adapted to human abilities and limitations rather than expecting individuals to adapt to poorly designed conditions. This alignment intends to promote the health, safety, efficiency, and overall well-being of workers (ILO & IEA, 2021).

[1] https://iea.cc/

As a scientific discipline, ergonomics integrates knowledge from multiple disciplines, including physiology, psychology, cognitive science, engineering, design, and organizational science. It operates at the intersection of theory and practice, seeking to apply empirical insights about human performance and cognition to real-world challenges in workplace and system design. Put differently, ergonomics is not limited to comfort or productivity. It also engages with a wide range of concerns, including musculoskeletal health, cognitive load, emotional stress, communication dynamics, and workflow coherence. Thus, its various levels of analysis span from the physical layout of a workstation to the social structures that shape communication and decision-making within organizations (Bridger, 2018).

The field of ergonomics is commonly divided into three interrelated domains: *physical ergonomics*, which addresses biomechanical and anatomical factors such as posture, force, and movement; *cognitive ergonomics*, which focuses on mental processes such as attention, memory, and decision-making; and *organizational ergonomics*, which examines how work systems, schedules, and institutional structures influence cooperation and human performance (ILO & IEA, 2021). While these domains provide useful distinctions, ergonomics is inherently systemic, requiring a comprehensive approach that considers the complex interactions among people, tools, and environments over time. By prioritizing human needs in the design and management of work systems, ergonomics contributes to safer, more humane, and more sustainable working environments. Although concerns about worker well-being can be traced back to earlier industrial periods, modern scientific ergonomics emerged in the mid-20th century, primarily during wartime research and post-war industrial growth (Bridger, 2018).

Early research was driven by the realization that errors in complex systems, such as aviation or military operations, often stemmed from poor design and a lack of understanding of human abilities, rather than individual error. Therefore, the origins of ergonomics are deeply intertwined with efforts to enhance human performance in safety-critical and technology-driven environments. During the post-World War II era, the field consolidated around two interlinked concerns: increasing efficiency and preventing accidents. The focus gradually shifted from purely physical concerns to include psychosocial and organizational dimensions of work. This expansion reflected a growing awareness that human error could not be fully explained by physical fatigue alone. Instead, factors

such as attention, memory, and decision-making also play crucial roles.

The term *ergonomics* was formally introduced in 1949 by K.F.H. Murrell, a British psychologist and one of the early pioneers of the field, during the establishment of the Ergonomics Research Society in the United Kingdom. The word itself derives from the Greek words ergon (ἔργον), meaning "work," and nomos (νόμος), meaning "law" or "principle".[2] Hence, ergonomics literally means "the science of work".[3] Researchers like Murrell were looking for a term that could cover a broad interdisciplinary field of study focusing on how people interact with machines, tasks, environments, and systems. Their goal was to create a space where physiology, psychology, and engineering could come together to tackle real-world problems in industrial and military settings. Initially, ergonomics researchers were mainly interested in optimizing human performance and reducing errors and fatigue in situations where even minor mistakes could have severe consequences.

By the 1960s and 1970s, ergonomics had gained institutional legitimacy through the establishment of professional associations and research bodies, including the International Ergonomics Association (IEA). These developments provided the foundation for the field's global expansion. In the meantime, the scope of ergonomics continued to evolve throughout the late twentieth century, particularly as work systems became more complex and more reliant on digital technologies. As a result, ergonomics increasingly addressed the cognitive demands of work, the design of user interfaces, and the psychological impacts of automation and information overload. This period also saw the emergence of participatory ergonomics, which emphasized the importance of involving workers in the design and evaluation of their own work systems. Notably, ergonomics has remained a fundamentally interdisciplinary field throughout its development. It has drawn on empirical research, theoretical modeling, and practical intervention to support a more holistic understanding of work. Ergonomics has matured from a field concerned with task efficiency and injury prevention into a complex, systemic science capable of addressing the challenges of contemporary labor, including those posed by digital transformation, organizational restructuring, and environmental degradation (Bridger, 2018).

Over time, ergonomics became more popular worldwide. While the term *human factors* is more commonly used in North America, particularly in engineering

[2] https://omt-veyhl.com/history-of-ergonomics/

[3] The term was first coined by the Polish scientist Wojciech Jastrzębowski in 1857.

and aviation contexts, *ergonomics* remains the preferred term in Europe and many other regions. The two are often used interchangeably, although in some contexts they carry slightly different emphases. For instance, *human factors* is sometimes associated more narrowly with cognitive and systems engineering, whereas *ergonomics* encompasses a wider range of physical, cognitive, and organizational domains (ILO & IEA, 2021). What is more, the formal naming of the field allowed ergonomics to distinguish itself from related disciplines and secure institutional recognition. The creation of professional societies, academic journals, and international collaborations soon followed, helping to consolidate ergonomics as a distinct and respected area of scientific inquiry.

Overall, the development of ergonomics shows an ongoing effort to balance work demands with human capacities and needs. From its beginnings in wartime problem-solving to its current focus on sustainability and systemic design, the field has become more inclusive, dynamic, and ethically aware. Its historical development highlights the importance of designing work that respects both biological limits and the social contexts of human activity, expanding to encompass environmental concerns.

Why Ergonomics, Why Now?

Translation is at a critical turning point, influenced by the rapid growth of digital technology, the rise of online and platform work, and the decline of institutional support systems. Translators, whether freelancers, institutional, or commercial translators and interpreters, face increasing uncertainty that endangers their professional futures and personal lives. These challenges show up as physical issues like repetitive strain injuries or eye strain (Chapter 3), mental overload, emotional burnout, and a deep sense of loneliness (Chapter 2). Despite being highly educated and skilled, many translators face systemic barriers that limit their independence, harm their health, and lower the quality of their work (Chapter 4).

This book takes these concerns as its starting point and proposes ergonomics as a conceptual and methodological lens through which to reexamine the conditions of translation work. Ergonomics, understood broadly, encompasses the study and design of systems that support human well-being and optimize interaction with tools, environments, and institutions. While its origins lie in industrial labor and human factors engineering, its principles are increasingly relevant to knowledge-based and digitally mediated professions such as

translation. In this context, ergonomics shifts the focus from individual coping strategies to systemic design, asking how physical, technological, organizational, and ecological translation environments can be made more supportive, just, and sustainable.

This reframing is especially urgent given the structural transformations underway in the translation industry. The widespread adoption of cloud-based translation environments, machine translation post-editing (MTPE), and generative AI tools such as ChatGPT has profoundly altered translators' workflows. While these technologies promise efficiency, they often introduce new burdens, such as fragmented attention, cognitive friction, and techno-anxiety, particularly when design choices ignore the user's needs or obscure decision-making processes (Chapter 2). Moreover, platformization has introduced new forms of labor extraction, where translators must conform to algorithmic management systems that reduce their work to metrics and deliverables, sidelining considerations of quality, agency, or professional ethics (Chapter 4).

Beyond the digital workplace, educational institutions have struggled to keep pace, as we will deep-dive in Chapter 5. Translator training programs frequently retain curricular models centered on linguistic theory and textual equivalence, offering limited engagement with the lived realities of professional translation. As a result, students are often ill-equipped to manage the complex and multifaceted demands they will face in practice. Empirical studies document significant misalignments between classroom practices and professional expectations, particularly in areas related to technological integration, workload management, and ergonomic literacy.

However, achieving true ergonomic justice in translation work and education begins when ableist tendencies are set aside and a fully inclusive perspective is adopted (Chapter 6). Efforts to boost accessibility and inclusion often fall short when they focus only on retrofitting existing systems or treating disability as a problem to be fixed afterward. What is really needed is a fundamental shift in how we think about and design the environments where translation takes place. This involves adopting reflexive ergonomics, where professionals with disabilities actively participate as partners in developing, evaluating, and leading innovative practices and technologies.

Moreover, the ecological side of translation work is gaining more attention (Chapter 7). The digital tools translators use consume a lot of energy and add

to electronic waste. Translators are becoming increasingly integrated with their technological environments, influencing and being influenced by them. As a result, ecological ergonomics, also known as green ergonomics, encourages us to broaden our concept of sustainability to encompass ecological constraints.

In light of these intersecting pressures, the need for an ergonomic approach to translation is both practical and ethical. It invites scholars, educators, tool developers, and institutional leaders to reconsider how systems are designed, how labor is valued, and how sustainability is conceptualized. This book does not offer prescriptive solutions or universal standards. Rather, it maps a field of inquiry that brings together empirical research, theoretical reflection, and lived experience to create a more humane, adaptive, and resilient model of translation work.

Expanding the Scope of Translation Studies

Translation Studies (TS), as a scholarly discipline, has long been anchored in linguistic and textual paradigms. Foundational models have emphasized notions such as equivalence, fidelity, and functionalism, aiming to establish systematic relationships between source and target texts (Munday, 2016). These frameworks, while critical to the development of the field, predominantly treated translation as a disembodied textual operation, abstracted from its sociomaterial context. The translator appeared as an invisible or neutral agent, and the workplace as a marginal concern. However, the field has undergone a significant epistemological shift over the past two decades. TS scholars have increasingly called attention to the embodied, situated, and sociotechnical nature of translation. Theories of situated cognition (Risku, 2002) and activity theory (Engeström, 1987; Hansen, 2006; Göpferich, 2009) reconceptualize translation as a process embedded in concrete settings, shaped by tools, interactions, and institutional constraints. These approaches highlight the significance of the translator's environment, which influences and shapes the process of translation.

Within this evolving landscape, ergonomics emerges as a conceptual bridge between theory and practice. Marie Lavault-Olléon (2011) was among the first to explicitly propose an ergonomic turn in TS, advocating for the integration of ergonomic principles into both research and pedagogy as a response to the evolving demands of professional translation. It addresses the translator as a cognitive actor and an embodied professional navigating complex systems. Ergonomics thereby extends the scope of TS to include systemic and material

dimensions often excluded from textual theories. This perspective makes it possible to ask how translators inhabit their workspaces, how they relate to their tools, and how institutional and technological structures enable or constrain sustainable professional practices. Moreover, ergonomics complements the empirical turn in TS (Ehrensberger-Dow & O'Brien, 2015). The use of methods such as eye-tracking, keystroke logging, and observational fieldwork has expanded the field's methodological repertoire, allowing researchers to document translators' real-time behaviors and contextualize their decisions. These methods align naturally with ergonomic inquiry, which is similarly committed to evidence-based analysis and systemic improvement. As such, ergonomics represents both a theoretical expansion and a methodological deepening of TS.

In proposing an ergonomic turn, this book builds on these developments and articulates a framework that centers translator well-being, institutional accountability, and ecological awareness. It joins a growing body of scholarship that advocates for TS to engage more fully with the lived experiences of translators and the systems within which they work. In doing so, it seeks to realign the discipline's priorities toward care, sustainability, and ethical responsiveness in a rapidly transforming professional landscape.

Four Dimensions of Translation Ergonomics

This book introduces a four-dimensional model of translation ergonomics that reflects the complexity and interdependence of contemporary translation work. These dimensions are not isolated categories but intersecting domains that collectively shape the translator's experience and performance.

Cognitive Ergonomics deals with mental processes such as attention, memory, decision-making, and interaction with digital tools. This branch is significant for translation practice as tool design, interface usability, and information architecture significantly influence cognitive load and emotional resilience of translators and interpreters (e.g., Ehrensberger-Dow & O'Brien, 2015).

Physical Ergonomics refers to the anatomical and physiological conditions under which translators work, including workstation design, seating, lighting, visual ergonomics, and the prevention of musculoskeletal strain. Empirical research (e.g., Meidert et al., 2016) has demonstrated that poorly designed work environments can lead to chronic health problems and reduced cognitive performance, particularly among individuals who engage in prolonged screen-

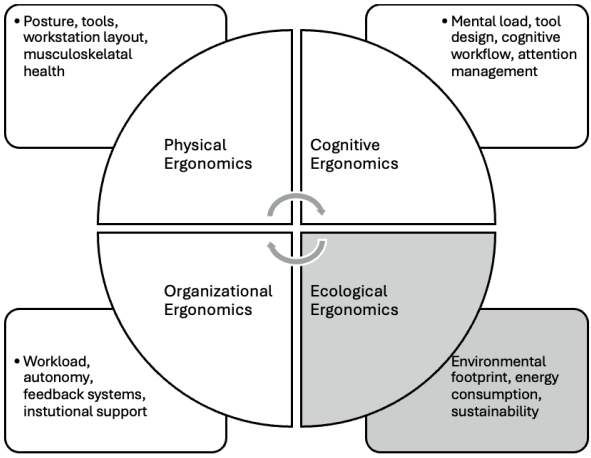
based labor.

Organizational Ergonomics addresses the structure and procedures within translation workflows, covering task distribution, autonomy, project coordination, communication channels, and feedback systems. Research highlights how organizational practices influence translators' mental health, job satisfaction, and professional identity (e.g., Bednárová-Gibová, 2021). When workflows are unclear, decision-making is restricted, or feedback is inadequate, it can lead to burnout and disengagement.

Here, *Ecological Ergonomics* is presented as a new and ethically essential aspect that should be further incorporated into TS, especially in the Turkish context. It highlights the environmental impact of translation infrastructures, such as the energy consumption of cloud-based CAT tools, data storage, and AI systems. Gengshen Hu (2020) frames translators as ecological agents whose work is embedded in extractive technological ecosystems. This dimension challenges us to consider sustainability in relation to planetary limits as well.

Together, these four dimensions constitute an integrated framework for assessing and improving the sustainability of translation work. By conceptualizing ergonomics as a systemic concern, rather than a set of isolated issues, this model enables a comprehensive understanding of the conditions under which translation is taught, performed, and valued.

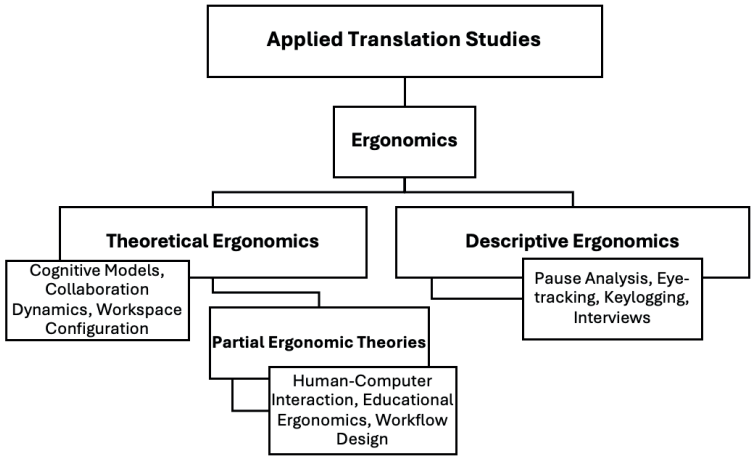
Figure 1: *Four-dimensional ergonomic framework*



Back to the Holmes' Map

Incorporating ergonomics into TS significantly reinterprets James S. Holmes' seminal structural map (1972 [2000]). Holmes distinguished between pure and applied branches of TS, categorizing applied translation as encompassing translator training, translation aids, and translation criticism. Ergonomics can expand this applied branch, bridging descriptive process research, pedagogical strategies, and institutional practices. It includes the practical, embodied, and infrastructural aspects of translation, incorporating empirical methodologies that systematically document translators' interactions within their workplaces. Such methods enable a nuanced analysis of translators' behaviors, decision-making processes, and adaptations to various ergonomic pressures. Let us envision an integrated map:

Figure 2: *Integrating ergonomics in the Holmes' Map*



Within this expanded framework, *theoretical ergonomics* can encompass comprehensive frameworks addressing translation cognition, patterns of collaboration, and workspace configuration. These frameworks aim to provide overarching insights into the professional environments in which translators work (e.g., Ehrensberger-Dow et al., 2020). Such comprehensive models seek to understand translators' cognitive loads and collaborative dynamics and to offer practical ergonomic guidelines to optimize translators' working conditions, enhance their cognitive performance, and reduce stressors such as cognitive overload or physical strain (e.g., Seeber & Arbona, 2020).

Partial ergonomic theories, by contrast, can address narrower contexts and specific practical concerns within translation processes, such as human-computer interaction (HCI), translation pedagogy ergonomics, and workflow ergonomics. For example, studies focusing on HCI ergonomics can provide practical solutions to the complex interactions translators have with technological tools, addressing issues such as tool overload, interface design, and usability. Such research aims to minimize cognitive friction arising from poorly designed technology, allowing translators to focus more directly on their primary linguistic tasks (e.g. Ehrensberger-Dow & O'Brien, 2015).

Similarly, *educational ergonomics* can explore the integration of ergonomic principles into translator education programs. It can offer a curriculum design that systematically integrates several key components: competence in translation technology, ergonomics training for educators, and the adoption of teaching methods that are informed by ergonomic principles. This approach ensures that both educators and learners are well-equipped to utilize technology effectively while maintaining a focus on health and comfort in the learning environment. Such pedagogical frameworks can foster the development of information literacy and technological adaptability, which are currently skills essential for translators to navigate increasingly complex and technologically sophisticated work environments.

Descriptive ergonomics, a crucial component within this framework, can employ empirical research methodologies to document and analyze translators' actual behaviors and interactions within their technological and organizational contexts. These methods include observational studies, pause analysis, eye-tracking studies, and keylogging (e.g., Kappus & Ehrensberger-Dow, 2020). Descriptive ergonomics can thus provide translation researchers with detailed insights into the real-life translation processes, emphasizing the practical challenges translators face, such as multitasking pressures, frequent interruptions, and technology-related cognitive strain. Such empirical analyses offer valuable data to refine ergonomic theories and inform pedagogical and institutional practices.

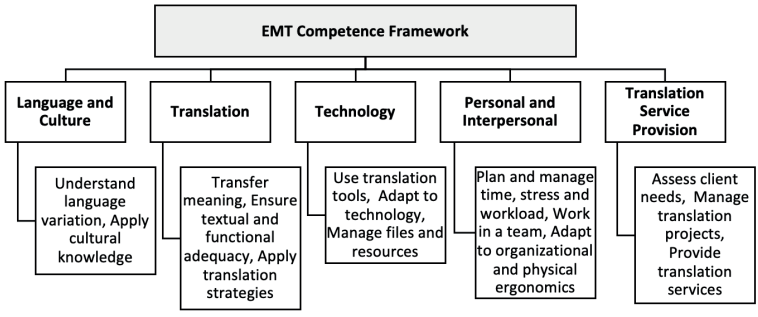
This paradigm shift, represented by ergonomics, is therefore twofold: it can be considered an epistemological realignment from purely textual paradigms to embodied, contextualized inquiry, and it also offers methodological tools that connect empirical observation with practical intervention. Ergonomics compels translation scholars and practitioners to reconsider established norms, moving

toward a comprehensive understanding of translation as an inherently human-centered and ecologically embedded profession. Through this realignment, ergonomics can enrich the conceptual repertoire of TS, at the same time fundamentally transforming how translation is taught, practiced, and theorized. Ultimately, we can utilize it to lay the groundwork for a more sustainable and ethically responsive professional future.

Ergonomics, Translator Education, and Institutional Practices

Several empirical studies have highlighted the persistence of a pedagogical gap between translation classrooms and real-world practice (Chapter 5). While the European Master's in Translation (EMT) Competence Framework explicitly mentions the importance of ergonomic awareness, particularly under the headings of technological and interpersonal competences, its practical application across institutions remains unrealized. EMT's emphasis on ergonomic competencies marks a significant change, but putting these standards into practice often falls short of a systematic approach, particularly in countries where resources, curriculum autonomy, and faculty development opportunities differ greatly. The EMT Board's 2017 updates emphasize the importance of recognizing stress, fatigue, and healthy work habits; however, these goals remain largely unachieved in many educational settings.

Figure 3: *European Master's in Translation (EMT) Competence Framework 2017*



The barriers to systemic integration of ergonomic principles into translator education are manifold. First, academia often has a mindset that sees cognitive or physical discomfort as a necessary part of the process, rather than something that can be fixed. This mindset of accepting stress and overload is deeply ingrained in the culture of higher education and is reinforced by rigid assessment

systems and static classroom layouts. Additionally, financial and infrastructure constraints make the problem worse. To address this, ergonomic redesigns like adjustable seating, proper lighting, translation tools, and usability testing would require investment and commitment from institutions, but these resources may not be evenly distributed across different programs. Furthermore, many instructors lack training in educational ergonomics and may not understand how physical, cognitive, or organizational stressors affect learning outcomes. We will go deeper into educational ergonomics in Chapter 5.

Thus, while the call for ergonomically enriched translation education is not new, its urgency has become increasingly apparent in light of ongoing transformations in the translation industry. With translator roles blending together, AI tools becoming more widespread, and expectations for translators' adaptability on the rise, it is time to rethink how we train and educate the new generations. If translators are not trained with ergonomic principles in mind, they will likely carry unnecessary stress, inefficiency, and burnout into their careers, ultimately contributing to a broken system. On the other hand, a curriculum that incorporates ergonomic principles can be a game-changer, one that helps students focus their cognitive efforts, stay physically comfortable, and navigate organizational structures with clarity. Therefore, the real challenge is recognizing ergonomics as a teaching concern and making it a core value in the institutional culture of translator education.

From Ergonomics to Sustainability

As the ergonomic paradigm in TS expands, it encourages a wider examination of sustainability related to individual well-being, organizational efficiency, and the planetary systems that encompass all professional practices. The traditional scope of ergonomics has focused on human-centered design, safety, and productivity. However, these goals cannot be meaningfully pursued without considering the environmental costs of translation technologies and infrastructures.

Translation, in its contemporary form, is deeply entangled with digital ecosystems that have not entirely been designed according to universal design norms, and thus, have low accessibility. Aside from accessibility issues, the cloud-based CAT tools, AI-driven translation engines, and online collaboration platforms contribute to significant energy consumption, electronic waste, and data extraction practices. These infrastructures rely on energy-intensive data