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# Technology in Language Teaching & Learning

ISSN 2652-1687

<https://www.castledown.com/journals/tltl/>

*Technology in Language Teaching & Learning*, 7(2), 103213 (2025)  
<https://doi.org/10.29140/tltl.v7n2.103213>

## Editorial: Technology-Enhanced Language Teacher Education: Opportunities, Challenges, and Futures



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### Introduction

In the 21st century, technology has rapidly gained momentum and emerged as a central pillar in both formal and informal discussions, with education occupying a particularly prominent position within these debates (Choi et al., 2025). Increasingly, educational institutions and policymakers alike recognise the transformative potential of technology to reshape teaching and learning practices, enhance access to knowledge, and redefine the roles of teachers and learners in diverse contexts. As Kamali et al. (2024) argue, as “technological advancements ... continue to reshape education, language teachers and teacher educators must be well-prepared for new challenges and opportunities” (p. 2). Like any new tool that introduces both opportunities and challenges, technology has brought significant benefits and complex implications to the educational landscape.

The conception of this special issue emerged from the intersection of the editors’ complementary areas of expertise and interest. Drawing on Kamali’s background in language teacher education (LTE) (e.g., Kamali, 2023, 2024, 2025), Mohebbi’s extensive experience in second language teaching and teachers’ assessment literacy (e.g., Crusan et al., 2023; Griffiths et al., 2025; Mohebbi & Coombe, 2022), and Xerri’s specialisation in educational technology and multimodality (e.g., Calleja & Xerri, 2024; Stroia & Xerri, 2024; Xerri, 2024; Xerri & Block, 2024), we collaboratively examined recent research at the

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nexus of LTE and technology. Through this review, we identified a clear gap: while there is growing interest in how technology reshapes language teacher preparation and practice, there is a dearth of focused collections that critically examine this relationship in depth. Motivated by this observation, we discussed the idea with the journal's editorial team, who supported the proposal for a special issue on this topic. To ensure diverse perspectives and robust contributions, we extended invitations to scholars working at this intersection and also issued an open call for papers. As a result, this special issue brings together six articles that explore a range of topics, contexts, and methodological approaches, offering fresh insights and setting an agenda for future research in technology-integrated LTE.

In this editorial, we first clarify what we mean by *technology* and examine the various dimensions it encompasses within the context of education, with a particular focus on LTE, and review recent research trends in the field that engage with technology and highlight key developments and ongoing debates. Following this, we provide an overview of the articles featured in this issue. Finally, we outline possible trajectories for future inquiry and practice in this rapidly evolving area.

### Technology in LTE

Contemporary technology comes in many forms and serves multiple purposes, and it has profoundly transformed nearly every aspect of our daily lives. From the smartphones in our pockets to the artificial intelligence behind search engines and recommendation systems, technology shapes how we communicate, work, learn, and even relax. Our daily routines are now intertwined with smart devices, from wearable fitness trackers that monitor our health to smart home systems that control lighting, temperature, and security with a voice command or tap on a screen. Even in areas like transportation, technology has brought major changes: ride-sharing apps like Uber and Bolt have altered urban mobility, while electric and self-driving cars promise to reshape how we think about commuting altogether.

In the field of education, diverse digital tools have opened up entirely new domains of learning and teaching. For example, the use of computers gave rise to Computer-Assisted Language Learning (CALL), to which an entire journal is dedicated (e.g., Hajimaghsoodi & Maftoon, 2020; Hajmalek & Sabouri, 2025; Sun et al., 2024), while the widespread availability of smartphones and tablets led to the development of Mobile-Assisted Language Learning (MALL) (e.g., Al-Shehab, 2020; Bradley & Al-Sabbagh, 2022). Likewise, online learning platforms and virtual classrooms have facilitated remote education, providing learners with the flexibility to access courses and resources regardless of their physical location (Karacan & Solhi, 2022; Marcum & Kim, 2020). More recently, educational robots have paved the way for Robot-Assisted Language Learning (RALL) (e.g., Derakhshan et al., 2025; Lee & Lee, 2022; Veivo & Mutta, 2022) by adding an interactive dimension to language practice, while AI-powered tutoring systems have introduced the emerging area of AI-Assisted Language Learning (AIALL) (e.g., Chen et al., 2025; Satvati et al., 2025), which offers personalised support and feedback that was once unimaginable. In addition, collaborative digital tools, such as shared online whiteboards, forums, and video conferencing (e.g., Ateş & Köroğlu, 2024; Mexhuani, 2025), have transformed how students and teachers interact, supporting blended and hybrid learning environments that combine the best of online and in-person education.

For instance, during the COVID-19 pandemic, millions of learners worldwide depended on tools like Zoom and Google Classroom to continue their studies remotely. While these advances make learning more accessible and flexible than ever, they also highlight the need to address challenges such as the digital divide (Van Dijk, 2020) and the ethical use of learner data (Kamali et al., 2024). What we learnt from the pandemic is that emergency remote teaching highlighted gaps in teachers' digital literacy, and this has implications for LTE (Calleja & Xerri, 2024). Altogether, technology continues to push the

boundaries of what is possible in education, helping people learn anytime, anywhere, and in ways that better suit their individual needs.

In LTE, the integration of technology has become increasingly critical. Yet this development also brings important challenges related to teachers' preparedness, development, and competence. A significant proportion of language teachers belong to generations predating Generation Z and did not grow up in digital environments, but have had to adapt to them later in life. In contrast, their students have been surrounded by technology from an early age. This generational divide can result in a significant gap between teachers' technological proficiency and students' expectations and learning habits. As such, developing teachers' digital literacies and equipping them with the skills and critical understanding needed to integrate technology meaningfully is an essential dimension of effective LTE (Jiang, 2025). Attending to this dimension ensures that teachers can model pedagogically sound uses of technology and respond effectively to the evolving demands of digital-age language education.

There has been a lot of research looking at how technology fits into LTE from many different aspects. For instance, some studies focus on helping teachers develop the digital skills and technological pedagogical content knowledge (TPACK) they need to use technology effectively in their classrooms (e.g., Kohnke & Zou, 2025; Tseng et al., 2020). Others explore how teachers feel about using technology, whether they feel confident or anxious, and how those feelings shape their teaching practices (e.g., Deng & Liu, 2025; Zhao, 2025).

Researchers have also examined how LTE programs are designed when technology is involved, such as blended or fully online courses (Sharma & Westbrook, 2016), virtual teaching practice, or using video tools to help teachers reflect and improve (e.g., Loranc et al., 2021). With the rise of tools like computer-assisted language learning, mobile apps, and even robots (see above for the examples), there is growing interest in how these innovations pave the way for more effective LTE.

At the same time, many studies look at how social media and online communities provide teachers with ongoing support and professional growth opportunities (e.g., Knight, 2020; Motteram & Dawson, 2019), as is the case in technology-enabled Communities of Practice (Jin et al., 2025). There is also important research that addresses bigger questions around fairness and ethics, like who has access to technology (Hébert et al., 2021), how teachers' privacy is protected (Marín et al., 2023), and how automated systems might influence their work (Mohammadi et al., 2023). More recently, scholars are exploring how new AI-powered tools are shaping LTE and what this means for teachers' roles and identities (Ghiasvand & Seyri, 2025; Li et al., 2024; Satvati et al., 2025).

All in all, this rich and varied research shows that technology touches almost every part of LTE, from building practical skills and designing courses to shaping how teachers see themselves and how they connect with others in a rapidly changing digital world.

### **Studies in this Special Issue**

This Special Issue brings together a timely and thought-provoking collection of contributions that critically examine how technology is reshaping LTE. As digital tools, AI systems, and online platforms become increasingly embedded in classrooms around the world, they raise fundamental questions about how teachers are prepared or would like to be prepared, how they sustain reflective practice, and how their well-being and professional identities are shaped in this rapidly changing landscape. Together, the works in this Special Issue remind us that technology's true value lies not merely in its novelty or efficiency but in how it can support, challenge, and enrich the deeply human work of teaching and professional learning.

Opening the issue, Daniel Xerri's article, 'Enhancing Reflective Practice in Language Teacher Education: Technology as a Critical Reflective Partner,' sets the conceptual foundation by exploring how digital tools can become active partners in teachers' reflective practice. Drawing on recent studies, Xerri argues that technologies such as AI-powered feedback tools, digital portfolios, video-based analysis, and collaborative online platforms can deepen teachers' capacity for critical reflection when used thoughtfully and purposefully. He proposes a five-principle framework (pedagogical alignment, depth, collaboration, transparency, and teacher agency) that situates technology within a human-centered reflective ecosystem. While cautioning against the risks of over-automation and ethical ambiguity, this piece insists that well-integrated digital tools can amplify, rather than replace, the teacher's role as an inquirer and co-constructor of meaning.

CHAN Ka Long Roy's contribution, 'Exploring GenAI-Aided Language Learning Tools in Language Classrooms: Insights from Language Teachers of English in Hong Kong,' shifts our attention to the realities of the classroom. This study brings forward the voices of secondary and tertiary English teachers in Hong Kong as they navigate the promises and pitfalls of generative AI tools. Through in-depth interviews, Chan uncovers a spectrum of perspectives. Some teachers see GenAI as a means of enhancing efficiency and supporting differentiated learning, while others express concerns about reliability, uneven institutional support, and ethical tensions. By foregrounding these localised insights, the article highlights how crucial it is to involve teachers in shaping how new AI tools are integrated into classroom practice, reminding us that innovation must always stay connected to teachers' lived contexts and needs.

Building on these classroom insights, Alexander F. Tang and Luis Javier Pentón Herrera revisit the theoretical foundations of digital competence frameworks in their invited review, 'Integrating Affective Knowledge into TPACK: A New Visual Representation.' This piece challenges the dominant reading of the TPACK model by arguing for the explicit integration of affective knowledge. Drawing on recent scholarship on teacher emotions and identity, the authors present a new visual model that embeds affect across all domains of TPACK. They remind us that teachers' moods, values, and emotional experiences fundamentally shape how they approach technology and make pedagogical decisions. By placing affective knowledge at the centre, this work calls for more humanising teacher education that takes teachers' emotional lives as seriously as their technical skills.

Looking outward to the broader research landscape, Kadir Karakaya, Muhammet Furkan Alpat, Hasan Uçar, Özlem Karakaya, and Aras Bozkurt map how generative AI is being addressed in LTE scholarship. Their article, 'Preparing Teachers for the Algorithmic Educational Landscape: A Critical Mapping of Generative AI Integration in Language Teacher Education,' offers a systematic bibliometric review that traces emerging research trends, and clusters them into five thematic areas: AI literacy and professional development, conversational AI tools, AI in instructional design and assessment, AI applications for EFL writing, and pre-service teachers' perceptions and readiness. Their critical mapping reveals both the promise and the blind spots in the current literature, especially the need for more emphasis on teacher agency and ethical awareness. Their contribution provides a solid starting point for future work that can help teacher educators prepare language teachers for a world increasingly shaped by powerful algorithmic systems.

Adding to this critical conversation, Sophia Mavridi's 'Hype, Fear, and Everything in Between: A Critical Typology of Responses to AI and Their Implications for Language Teacher Education' examines how educators and institutions react (often in contradictory ways) to the growing presence of AI in education. Mavridi offers a typology of five orientations, ranging from prohibition and hype to more balanced critical engagement. She demonstrates how each position carries different assumptions about the role of technology, the purpose of teaching, and the place of ethics. By unpacking these positions, Mavridi reminds us that the conversations around AI are not only technical but deeply pedagogical and

political. Her practical implications urge teacher educators to foster discernment, clarity, and teacher agency in navigating these debates.

Finally, Sara Haghi, Muhammad Jafarpour, Mohammad Behroojeh, and Jaber Kamali bring a unique and timely focus to teacher immunity in their narrative inquiry, ‘Technological Interventions and Language Teacher Immunity: A Narrative Inquiry into Triggers and Coping Strategies.’ While the other contributions explore technology’s promise and its pedagogical integration, this study turns to the hidden pressures that technological demands can place on teachers’ emotional resilience. Drawing on narrative frames, reflective journals, and follow-up interviews with three in-service teachers, the authors unpack how educational, contextual, and learner-related factors (like inadequate professional development, limited access, or outdated equipment) can trigger professional stress. What stands out in this piece is its human detail: the ways teachers craft coping strategies through personal preparation, peer support, and creative workarounds. Their findings remind us that teacher immunity is not simply about resisting change, but about maintaining balance and professional identity in the face of ever-evolving technological demands. By centering teacher voices and stories, this study calls attention to the practical and emotional scaffolding needed to ensure that technological innovation does not come at the expense of teacher well-being.

Following these studies, three book reviews in this special issue extend the discussion from classroom practice to institutional policy and assessment. The review of *Artificial Intelligence, Real Teaching: A Guide to AI in ELT* foregrounds practical frameworks for critical AI literacy, integrity, and teacher-led adoption. The review of *Transforming Hanzi Pedagogy in the Digital Age* then widens the lens, arguing for a research-informed shift from handwriting to e-writing and offering actionable implications for task design in L2 Chinese. Finally, the review of *AI in Language Teaching, Learning, and Assessment* synthesizes global perspectives on ethics, policy, and evaluation, and maps opportunities and guardrails for sustainable integration.

Taken together, the empirical studies and book reviews in this Special Issue underscore that meaningful technology integration in LTE goes far beyond adopting new tools. It demands critical reflection, thoughtful design, ethical and assessment literacies, respect for teachers’ emotions and identities, and deep sensitivity to local contexts. Read as a whole, the collection traces a coherent line from classroom practice and script-specific pedagogy to institutional policy and evaluation, while keeping teacher well-being at the center. The next section outlines the research trajectories opened by this Special Issue.

### Future Trajectories

Taken together, the articles in this Special Issue point towards many directions that future research in LTE and technology could take. If there is one clear message that emerges, it is that our work as researchers, teachers, school leaders, and teacher educators must not stop at exploring *what* technologies can do; it must continue asking *how* they are experienced, negotiated, and shaped by teachers as people, working within very real constraints and possibilities (Möttus et al., 2025).

One important area for further research is the relationship between reflective practice and technology in contexts beyond those represented here. Daniel Xerri’s framework offers an important foundation, but we still know little about how different tools, such as AI-based feedback systems, digital portfolios, and video reflection platforms (see, for example, Feder & Cramer, 2023; Kamali & Javahery, 2025; Mohammadi et al., 2023), actually work in diverse settings. How do teachers in under-resourced schools experience these tools? How do early-career teachers differ from more experienced colleagues in how they use technology for reflection? More studies that trace these questions through long-term,

context-sensitive designs would help build a clearer picture of what makes technology-enhanced reflection genuinely sustainable.

The research in this issue also highlights that more attention is needed to teachers' affective experiences with technology. The expanded TPACK model proposed by Tang and Pentón Herrera reminds us that any framework for teacher knowledge must address teachers' emotions, values, and vulnerabilities. Future research could take this further by exploring how specific emotions, such as anxiety, curiosity, or even hope, shape teachers' willingness to adopt or adapt new tools. Narrative and ethnographic methods (see, for example, Tafazoli & Meihami, 2023; Weng, 2025) could play a valuable role here, helping us listen more deeply to teachers' inner worlds as they navigate technological change.

Another area that calls for sustained inquiry is teacher agency in the age of generative AI. The studies by Chan and by Karakaya and colleagues show both the practical promise of AI tools and the blind spots in how teacher education prepares and develops teachers to use them. Future research might examine how teachers negotiate tensions between institutional pushes for AI adoption and their own professional judgment. How can pre- and in-service teacher education equip teachers to make wise, ethical, and pedagogically principled choices about AI? Collaborative action research and other forms of practitioner inquiry could offer one fruitful path, positioning teachers as co-researchers who test and shape AI use in context (see, for example, Dikilitaş et al., 2025; Xerri, 2021, 2022).

Mavridi's typology reminds us that broader discourses of hype, fear, or prohibition often shape policy and institutional choices more powerfully than individual teachers do. Researchers should keep asking how these discourses circulate within different educational systems and how they affect teacher preparedness and autonomy. Comparative studies across regions and educational levels could shed light on how teachers make sense of sometimes conflicting narratives about AI and digital tools.

Finally, Haghi and colleagues' study on teacher immunity makes an important contribution by drawing attention to the emotional cost of technological pressures. Future research would do well to follow this line of inquiry, investigating how teachers cope with technological demands and how institutions can better support their well-being. How can professional development be designed (by schools or teachers per se) to strengthen teachers' resilience without normalising burnout? What role might peer mentoring or community-based support play in helping teachers sustain healthy boundaries in tech-rich classrooms?

Across all these directions, one thing is clear: research that foregrounds teacher voice and agency, that makes room for uncertainty, and that embraces complexity will remain vital. As digital tools continue to evolve, our scholarship must keep asking not just *what works*, but *for whom, under what conditions, and with what consequences*. By doing so, we keep alive the most important task of all: ensuring that technology serves teachers, not the other way around.

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