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Integrating Affective Knowledge into TPACK: A New Visual Representation

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Abstract

This invited review critically examines the Technological Pedagogical Content Knowledge (TPACK) framework and argues for the integration of Affective Knowledge (AK) as a foundational component in technologically mediated pedagogy. Drawing on recent scholarship in emotional and teacher education, the article identifies a persistent gap in how TPACK conceptualizes the affective experiences of educators, particularly in the context of emerging technologies and digital learning. Building on McLay and Reyes Jr.'s (2024) Technological Affective Pedagogical Content Knowledge (TAPACK) model, we propose a new visual representation that retains Contextual Knowledge while embedding AK across all TPACK domains. This reimagined model acknowledges that emotions, values, and moods are not peripheral but central to how teachers engage with technology, make pedagogical decisions, and navigate professional identity. We conclude with implications for teacher education, calling for emotionally informed professional development and a shift toward more humanizing approaches to technology integration.

Keywords: affective knowledge, TPACK, emotional intelligence, technology in language teaching, teacher emotions

Introduction

Since the conception of the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006), TPACK has become a foundational framework for understanding the knowledge domains teachers must integrate to effectively use technology in their classrooms.

Data Availability Statement: *All relevant data are within this paper.*

TPACK emphasizes the dynamic interplay among Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), and Technological Pedagogical Content Knowledge (TPACK), asserting that effective teaching with technology requires a nuanced understanding of how these knowledge domains intersect. For clarity, TK pertains to a teacher's understanding of various technologies and their potential applications within educational settings. PK involves an awareness of how students learn, the implications of effective instructional strategies, and the creation of supportive and engaging learning environments. CK refers to a deep understanding of the subject matter to be taught. Recently, Mishra (2019) included Context Knowledge (XK), which includes "everything from a teacher's awareness of available technologies to the teacher's knowledge of the school, district, state, or national policies they operate within" (p. 76), which encircles the TPACK framework. According to Mishra (2019), when teachers possess robust knowledge of all three areas—TK, PK, and CK—in addition to XK, they are better equipped to integrate technology in pedagogically sound ways that support content delivery in various contexts. For instance, a teacher with comprehensive TPACK can purposefully select and apply digital tools and instructional strategies that align with both the learning objectives and students' needs, depending on the educational setting, thereby enhancing the overall learning experience.

Over the past two decades, the framework has informed teacher education, curriculum design, and professional development across a range of educational contexts (Chai et al., 2013; Schmid et al., 2024; Tseng et al., 2022). However, while TPACK offers a robust cognitive and epistemological framework for conceptualizing teacher knowledge, it has been critiqued for several weaknesses (Graham, 2011). For example, there is limited engagement with the affective dimensions of teaching and learning with technology (Huang et al., 2022). Specifically, the framework does not explicitly account for how teachers' and learners' emotions, beliefs, motivations, or affective experiences interact with the use of technology in pedagogical practice. As research increasingly underscores the role of emotion in teacher identity (Zemblyas, 2007), digital engagement, and student learning, this omission represents a critical gap. Thus, in this invited review, we provide a critical examination of available literature on TPACK and, through the lens of Affective Knowledge (AK; McLay & Reyes Jr., 2024), highlight how affect remains undertheorized and under-integrated within the framework. In doing so, we call for an expanded conception of TPACK—one that meaningfully incorporates AK as an essential component of technologically-mediated pedagogy in language education.

TPACK: A Literature Review

Conception of TPACK

Originally conceptualized by Schulman (1986), Pedagogical Content Knowledge (PCK) was introduced to emphasize the unique knowledge teachers need to teach specific subject matter effectively. PCK bridges CK (i.e., what teachers know) and pedagogical knowledge (i.e., how they teach), highlighting that effective teaching requires understanding how to represent content in ways that are comprehensible and engaging to learners. PCK includes knowledge of student misconceptions, curricular materials, and instruction strategies tailored to specific subjects. Shulman's conception of PCK laid the theoretical groundwork for Mishra and Koehler's (2006) development of the Technological Pedagogical Content Knowledge (TPACK) framework.

Introduced by Mishra and Koehler (2006), TPACK has become a foundational framework building on Schulman's conception of PCK. Mishra and Koehler (2006) argued that 21st-century teaching also demands a deep understanding of technology. TPACK expands PCK by integrating technological knowledge (TK), emphasizing that effective technology integration in teaching requires an understanding of education technology research, offering a way to conceptualize the complex interplay

between teachers' knowledge of content, pedagogy, and technology. Therefore, TPACK reflects a more holistic view of teaching knowledge in the digital age. Over the past two decades, this framework has been widely adopted to guide teacher education, professional development, and curriculum design.

Recent Research and Developments in TPACK

Numerous studies have since sought to explore, validate, and extend the TPACK framework across diverse educational settings (Chai et al., 2013; Schmid et al., 2024; Tseng et al., 2022). For example, Harris et al. (2009) investigated how in-service teachers apply TPACK in curriculum planning, highlighting the nuanced ways teachers align technological tools with pedagogical goals and content-specific needs. Their study introduced *learning activity types* as a practical scaffold, helping teachers make more informed decisions about technology integration based on curricular objectives and pedagogical strategies. Similarly, Celik (2023) investigated how teachers' professional knowledge, encompassing technological, pedagogical, and CK, can be expanded to include the ethical integration of artificial intelligence (AI)-based tools in education settings. The study introduced the concept of *Intelligent-TPACK*, emphasizing the need for teachers to develop competencies that address both the pedagogical potentials and ethical considerations of AI technologies in the classroom. These two examples offer valuable insights into the nature of the TPACK framework, particularly with regard to curriculum design and particularly in the context of emerging technologies like AI.

Practice-Based Applications of TPACK

In response to calls for more practice-based applications of TPACK, Tai (2015) proposed the *TPACK-in-Action* model, highlighting how teachers' TPACK is dynamically enacted in specific classroom contexts. TPACK-in-Action emphasizes the dynamic interplay of technology, pedagogy, and content in authentic teaching contexts, which aligns with several empirical studies that have explored practice-based applications of TPACK. These studies provide insights into how teachers integrate technology into their instructional planning and delivery.

Harris and Hofer (2011) investigated how experienced secondary social studies teachers applied TPACK in their curriculum-based, technology-related instructional planning. The study found that after engaging in professional development focused on content-based learning activities, teachers became more strategic in their selection and use of technologies, leading to more student-centered instruction and higher standards for technology integration. Koh et al. (2014) examined the contextual influences on teachers' construction of TPACK. They discovered that factors such as school culture, leadership support, and access to resources significantly affected how teachers developed and applied their TPACK, highlighting the importance of considering contextual elements in TPACK development. These studies underscore the importance of situating TPACK within real-world teaching contexts. They demonstrate that effective technology integration is not just about possessing knowledge of technology, pedagogy, and content in isolation, but about the ability to synthesize these domains in response to specific teaching situations. This aligns with Tai's (2015) assertion that TPACK should be viewed as an actionable framework, guiding teachers in making informed decisions about technology use in their classrooms.

This TPACK-in-Action model emphasizes the contextualized and performative nature of TPACK yet remains primarily focused on observable behavior and cognitive knowledge domains. Empirical research in TPACK-in-Action supports the notion that TPACK is most effectively developed and applied when teachers engage in reflective practice, consider contextual factors, and participate in targeted professional development that emphasizes the integration of technology with pedagogy and content knowledge.

AI Integration in the TPACK Framework

With the increasing influence of AI in education, scholars have begun to reflect on how TPACK might evolve to incorporate new epistemological and ontological concerns. With the turn to AI, Mishra et al. (2023) have modified the TPACK framework to integrate emerging technologies such as ChatGPT. More recently, Lee and Jeon (2024) applied the TPACK framework to the integration of chatbots in lesson planning, offering an example of how emerging technologies can be scaffolded through TPACK. This study shows that chatbot design fosters reflective and student-centered teaching practices, supporting the meaningful integration of AI in language education. In addition, Bautista et al. (2024) assessed the readiness of preservice teachers to integrate AI-based tools into education through the TPACK framework. Findings revealed that while pre-service teachers exhibited readiness in technology knowledge areas, there is a need for further development in ethical readiness and the integration of AI tools in pedagogical practices. Their study, like many others, maintains a cognitive and procedural lens, leaving the affective dimensions of teaching and learning largely unaddressed.

However, this AI turn also necessitates a parallel consideration of the affective turn in applied linguistics (Pavlenko, 2013; White, 2018), suggesting that TPACK must expand to include how emotions and affective knowledge shape teachers' technological decision-making. This shift aligns with broader trends in educational research that underscore the importance of teacher emotions, identity, and motivation in shaping pedagogical practices (Zembylas, 2007). Given these recent developments, there remains a notable lack of empirical and theoretical work integrating affect into TPACK. While some have gestured toward the need for emotional dimensions of teacher knowledge, the framework itself continues to be predominantly framed as a knowledge-based framework rooted in cognition. This article seeks to address the gap by proposing a more holistic understanding of TPACK–one that includes AK as central to the ways teachers make decisions, engage with technology, and respond to their students' needs in digital environments.

Gaps in Research

Despite the influence of affective states on technology engagement, studies examining TPACK development have largely overlooked the emotional dimensions that shape how teachers interact with and internalize new knowledge. TPACK development involves far more than acquiring new technical competencies; it also requires navigating a complex landscape of emotional experiences. Educators engaging with unfamiliar technologies often experience a range of emotions, including self-doubt, apprehension, curiosity, and moments of empowerment (e.g., Chiu, 2025; Huang et al., 2022)—all affective states that actively shape how they learn, teach, and evolve personally and professionally. Huang et al. (2022) emphasize that emotions are deeply intertwined with self-regulated learning (SRL), showing that teachers who engage more effectively in SRL processes tend to report more constructive and engaged emotional experiences during TPACK development. Their research highlights that supporting emotional awareness can enhance how teachers engage with and internalize new knowledge. Yet teacher education programs rarely include explicit attention to emotional intelligence (Pentón Herrera, 2024), treating technology adoption as a procedural rather than relational or affective endeavor. Providing space for teachers to reflect on their emotional responses, values, and beliefs related to technology could lead to more sustainable and authentic integration. Emotion-aware environments, whether supported through mentorship, design tools, or reflective dialogue, can help educators navigate the affective dimensions of TPACK with greater agency and self-understanding.

Emotions do not arise in isolation; they are socially constructed, contextually situated, and deeply relational (Zembylas, 2007). In teaching, emotional experiences are co-produced through interactions with students, colleagues, institutional norms, and broader sociopolitical discourses. Yet the TPACK

framework, including the latest version (Mishra, 2019; Petko et al., 2025), treats knowledge as largely individual and internal, missing the opportunity to engage with the social ecologies of emotion that shape educators' engagement with technology. When teachers feel disempowered by mandates, isolated in their schools, or unsupported by leadership, their emotional orientation to innovation is understandably affected (Kelchtermans, 2005; Sutton & Wheatley, 2003). These conditions are not merely background variables; they are affective landscapes that influence how TPACK is enacted. In bypassing the social and emotional dynamics of teaching, the TPACK framework risks reinforcing a technocratic view[1] of practice that reduces complex human work to skill sets and checklists. If we agree that emotions happen in social contexts (Mesquita & Boiger, 2014), then technology integration must be understood as both a cognitive and social-emotional event, not just an instructional upgrade. This represents a missed opportunity to engage with the socio-affective ecosystems that influence teachers' engagement with technology, which is an area that remains underexplored in TPACK-related research.

Educators' emotional experiences significantly shape their willingness to adopt and sustain new technologies in their classrooms. Emotions such as overwhelm, skepticism, or disconnection can act as barriers, while feelings of curiosity, efficacy, or connection can facilitate engagement and experimentation. Yang et al. (2025) demonstrate that affective states moderate the relationship between TPACK and teachers' willingness to integrate generative artificial intelligence (GenAI); in particular, emotional strain weakens the positive effects of TPACK, while the psychological needs of competence and relatedness help buffer these effects. Their findings challenge the idea that technical training or access alone can ensure adoption, emphasizing instead the centrality of emotional and motivational readiness. Yang et al.'s (2025) findings, which align with previous findings from Beaudry and Pinsonneault (2010), remind us that emotional responses do not merely accompany technology integration; they help determine whether it happens at all, and under what conditions. Thus, to deepen the impact of TPACK in practice, we propose considering teachers' affect, well-being, and need satisfaction as core components of professional development and learning.

Teaching is an inherently emotional and value-laden act, involving judgment, relationships, and responsiveness to dynamic classroom realities (Gkonou et al., 2020; Karimi et al., 2025). However, the TPACK framework, even in its updated form, which added *Contextual Knowledge* (Mishra, 2019; Petko et al., 2025), continues to center technical and cognitive domains, thereby sidelining the affective dimensions of teaching. This omission is significant given that context and affect are not discrete elements but deeply entangled, and given that classrooms are emotional as much as they are instructional spaces. Responding to this gap, McLay and Reyes Jr. (2024) reconceptualize TPACK as TAPACK, making space for the affective domain (or Affective Knowledge; AK), including emotions, moods, attitudes, and values, as central to technology integration. They suggest that affective orientations—not just skills or access—are often decisive in whether educators meaningfully integrate technology, especially in the 21st century. Even though the TPACK framework remains influential and valuable, incorporating the affective dimension through frameworks like the TAPACK offers a way to deepen and humanize its application, particularly in the increasingly emotionally complex realities of contemporary classrooms.

Rather than retrofitting AK into existing models as an afterthought, TAPACK offers a more generative path forward—one that treats emotional knowledge not as peripheral but as integral to professional practice. By explicitly naming the affective domain (including moods, emotions, values, and

[1]A technocratic view of teaching refers to an approach that frames education as a set of technical problems to be solved through efficiency, standardization, and control—often at the expense of relational, emotional, and contextual dimensions of practice (Biesta, 2015).

attitudes) alongside pedagogical, technological, and content knowledge, TAPACK acknowledges that teachers are not just knowledge transmitters, but emotional beings embedded in relationships and communities (McLay & Reyes Jr., 2024). This shift reorients the conversation, inviting teacher education to situate emotions, cultivate reflective practices, and design emotionally supportive environments where technological adoption is not imposed but co-constructed. In doing so, TAPACK resists the dehumanizing tendencies of purely instrumental frameworks and reclaims the classroom as a space of emotional labor, connection, and care. If we are to move beyond tokenistic inclusion of emotion, and beyond the restrictive binaries of 'positive' and 'negative' emotions (see Karimi et al., 2025), we must center and design for the human, recognizing that sustainable innovation in education begins with how teachers feel, relate, and belong. As research on technology integration continues to evolve, frameworks like TAPACK offer a compelling roadmap for addressing the emotional blind spots in existing conversations at the intersection of technology and education, as well as for centering emotional knowledge as a foundational component of teacher learning and pedagogical change.

Adding Affective Knowledge (AK) to TPACK: TPACK + AK

As education continues to evolve within increasingly digitized and emotionally complex contexts, we posit that researchers and practitioners must reconsider how emotions are conceptualized and integrated into frameworks and practices guiding teacher knowledge. For example, ongoing conversations place significant emphasis on external literacies such as digital, civic, and technological fluency; however, the affective literacies that help teachers understand and regulate their inner emotional lives remain marginalized (Gkonou et al., 2020; Karimi et al., 2025; Zembylas, 2007). The emotional landscape of teaching is often relegated to the private domain, unspoken and unaccounted for in teacher education, even though it fundamentally shapes classroom practices and professional identity (Hargreaves, 1998; Zembylas, 2005). We argue that emotions remain peripheral but are foundational to ethical and effective teaching in the 21st century. As such, the integration of affective dimensions into professional development and learning, in our view, should be thought of as a new and much-needed form of civic education in the new age, particularly as technology becomes more prominent in our lives inside and outside learning spaces. Teachers' ability to engage with technology ethically, relationally, and humanely is inseparable from their capacity to understand and navigate their own emotions.

Building on the foundations of both the TPACK and TAPACK frameworks, we propose a more integrative visual representation, shown in Figure 1, that retains the 2019 and 2025 inclusion of Contextual Knowledge (Mishra et al., 2019; Petko et al., 2025) while embedding affect across all domains. While McLay and Reyes Jr. (2024) offered an important corrective by foregrounding the affective domain in their TAPACK framework, their visual representation seems to replace *Contextual Knowledge* with *Affective Knowledge*, potentially positioning the two as interchangeable. This trade-off overlooks the entanglement of context and emotion; affect does not exist in abstraction but is generated within specific institutional, cultural, and interpersonal environments (Mesquita & Boiger, 2014).

Therefore, our proposed visual preserves the original TPACK triad (TK, PK, CK), encircled by Contextual Knowledge, as proposed by Mishra (2019) and Petko et al. (2025), with AK depicted as a permeating flow through and around all elements. In other words, TPACK + AK. This framing better captures the interdependence of affect and context, while resisting a compartmentalized or encircled view of emotions. It invites educators and scholars alike to view emotional awareness as an essential lens through which all personal and professional knowledge is enacted and interpreted.

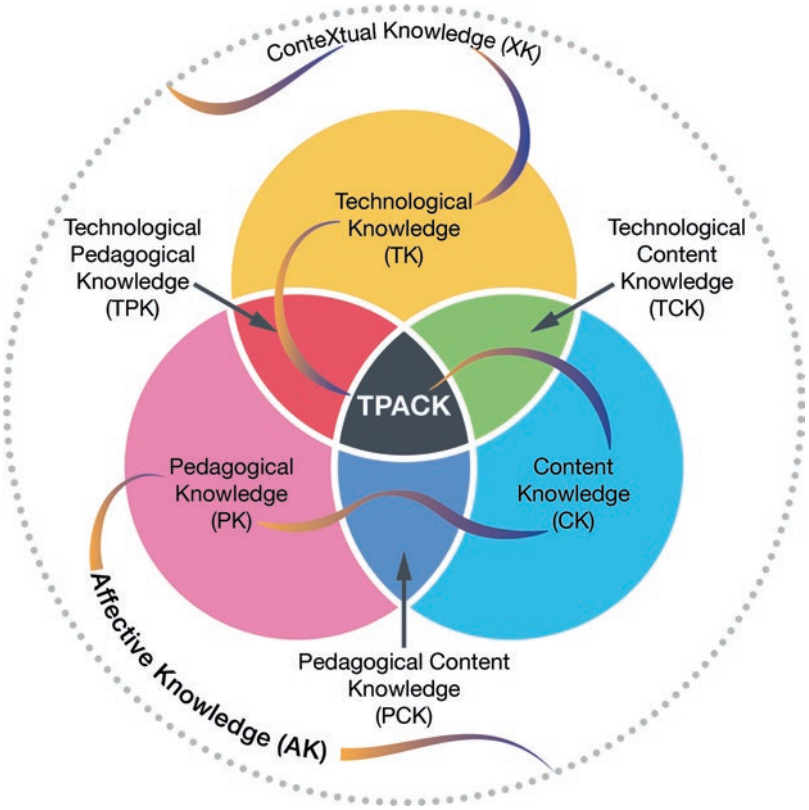

Figure 1 *TPACK Framework with Affective Knowledge (AK).*

Future Directions and Final Thoughts

This re-envisioned framework signals important directions for future research and professional practice. Studies are needed that explicitly examine how emotions, or AK shape the enactment of technological, pedagogical, and CK in diverse settings. Moreover, research should explore how emotional climates, institutional cultures, and interpersonal relationships mediate the integration of technology, particularly in underrepresented or resource-constrained contexts. By engaging with the emotional architectures of teacher learning, within and beyond the TAPACK framework, scholars can illuminate how affect both enables and constrains innovation, resilience, and ethical decision-making in technologically mediated classrooms (Sutton & Wheatley, 2003; Yang et al., 2025). Furthermore, we propose that professional development and learning programs be designed to enhance teachers' technical and affective competencies equally. In our view, centering emotions (or AK) as a cross-cutting influence rather than a discrete variable, we move toward a vision of educational technology that is profoundly humanizing and responsive to the lived realities of teachers and learners alike.

References

Bautista, A., Estrada, C., Jaravata, A. M., Mangaser L. M., Narag, F., Soquila, R., & Asuncion, R. J. (2024). Preservice teachers' readiness towards integrating AI-based tools in education: A TPACK approach. *Educational Process: International Journal*, *13*(3), 40–68. https://doi.org/10.22521/edupij.2024.133.3

Beaudry, A., & Pinsonneault, A. (2010). The other side of acceptance: Studying the direct and indirect effects of emotions on information technology use. *MIS Quarterly*, *34*(4), 689–710. https://doi.org/10.2307/25750701

Biesta, G. J. J. (2015). *Good education in an age of measurement: Ethics, politics, democracy*. Routledge.

Celik, I. (2023). Towards Intelligent-TPACK: An empirical study on teachers' professional knowledge to ethically integrate artificial intelligence(AI)-based tools into education. *Computers in Human Behavior*, *138*, Article 107468. https://doi.org/10.1016/j.chb.2022.107468

Chai, C. S., Koh, J. H. L., & Tsai, C.-C. (2013). A review of technological pedagogical content knowledge. *Educational Technology & Society*, *16*(2), 31–51.

Chiu, Y. Y. (2025). Transformative learning: Reflection on the emotional experiences of schoolteachers during and after the pandemic. *Frontiers in Education*, *10*, Article 1486449. https://doi.org/10.3389/feduc.2025.1486449

Gkonou, C., Dewaele, J-M., & King, J. (Eds.) (2020). *The emotional rollercoaster of language teaching*. Multilingual Matters.

Graham, C. R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers and Education, 57*(3), 1953–1960. https://doi.org/10.1016/j.compedu.2011.04.010

Hargreaves, A. (1998). The emotional practice of teaching. *Teaching and Teacher Education*, *14*(8), 835–854. https://doi.org/10.1016/S0742-051X(98)00025-0

Harris, J. B., & Hofer, M. J. (2011). Technological pedagogical content knowledge (TPACK) in action: A descriptive study of secondary teachers' curriculum-based, technology-related instructional planning. *Journal of Research on Technology in Education*, *43*(3), 211–229. https://doi.org/10.1080/15391523.2011.10782570

Harris, J., Mishra, P., & Koehler, M. (2009). Teachers' technological pedagogical content knowledge and learning activity types. *Journal of Research on Technology in Education*, *41*(4), 393–416. https://doi.org/10.1080/15391523.2009.10782536

Huang, X., Huang, L. & Lajoie, S.P. (2022). Exploring teachers' emotional experience in a TPACK development task. *Educational Technology Research & Development*, *70*, 1283–1303. https://doi.org/10.1007/s11423-022-10135-7

Karimi, M. N., Pentón Herrera, L. J., & Mansouri, B. (Eds.) (2025). *Teacher emotions as personal and professional development in applied linguistics*. Multilingual Matters.

Kelchtermans, G. (2005). Teachers' emotions in educational reforms: Self-understanding, vulnerable commitment and micropolitical literacy. *Teaching and Teacher Education*, *21*(8), 995–1006. https://doi.org/10.1016/j.tate.2005.06.009

Lee, S., & Jeon, J. (2024). Enhancing pre-service EFL teachers' TPACK through chatbot-integrated lesson planning projects. *Language Learning & Technology*, *28*(1), 1–20. https://hdl.handle.net/10125/73598

Koh, J. H. L., Chai, C. S., & Tay, L. Y. (2014). TPACK-in-action: Unpacking the contextual influences of teachers' construction of technology pedagogical content knowledge (TPACK). *Computers & Education*, *78*, 20–29. https://doi.org/10.1016/j.compedu.2014.04.022

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record: The Voice of Scholarship in Education*, *108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Mishra, P. (2019). Considering contextual knowledge: The TPACK diagram gets an upgrade. *Journal of Digital Learning in Teacher Education*, *35*(2), 76–78. https://doi.org/10.1080/21532974.2019.1588611

Mishra, P., Warr, M., & Islam, R. (2023). TPACK in the age of ChatGPT and Generative AI. *Journal of Digital Learning in Teacher Education*, *39*(4), 235–251. https://doi.org/10.1080/21532974.2023.2247480

McLay, K. F., & Reyes Jr., V. C. (2024). Beyond TPACK: A case for foregrounding affect in technology rich 21st-century teaching and learning. *Journal of Computer Assisted Learning*, 40(6), 3201–3214. https://doi.org/10.1111/jcal.13055

Mesquita, B., & Boiger, M. (2014). Emotions in context: A sociodynamic model of emotions. *Emotion Review*, *6*(4), 298–302. https://doi.org/10.1177/1754073914534480

Pavlenko, A. (2013). The affective turn in SLA: From 'affective factors' to 'language desire' and 'commodification of affect'. In D. Gabryś-Barker & J. Bielska (Eds.), *The affective turn in second language acquisition* (pp. 3–28). Multilingual Matters.

Pentón Herrera, L. J. (2024). An agenda for emotional intelligence in language teacher education. *Language Teacher Education Research*, *1*, 48–63. https://doi.org/10.32038/lter.2024.01.03

Petko, D., Mishra, P., & Koehler, M. (2025). TPACK in context: An updated model. *Computers and Education Open*, *8*, Article 100244. https://doi.org/10.1016/j.caeo.2025.100244

Schmid, M., Brianza, E., Mok, S. Y., & Petko, D. (2024). Running in circles: A systematic review of reviews on technological pedagogical content knowledge (TPACK). *Computers & Education*, *214*, Article 105024. https://doi.org/10.1016/j.compedu.2024.105024

Schulman, S. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4–14. https://doi.org/10.3102/0013189X015002004

Sutton, R. E., & Wheatley, K. F. (2003). Teachers' emotions and teaching: A review of the literature and directions for future research. *Educational Psychology Review*, *15*(4), 327–358. https://doi.org/10.1023/A:1026131715856

Tai, S.-J. D. (2015). From TPACK-in-Action workshops to classrooms: CALL competency developed and integrated. *Language Learning & Technology*, *19*(1), 139–164. http://hdl.handle.net/10125/44406

Tseng, J.-J., Chai, C. S., Tai, L., & Park, M. (2022). A critical review of research on technological pedagogical and content knowledge (TPACK) in language teaching. *Computer Assisted Language Learning*, *35*(4), 948–971. https://doi.org/10.1080/09588221.2020.1868531

White, C. (2018). The emotional turn in applied linguistics and TESOL: Significance, challenges and prospects. In J. de Dios Martínez Agudo (Ed.), *Emotions in second language teaching: Theory, research, and teacher education* (pp. 19–34). Springer.

Yang, Y., Xia, Q., Liu, C., & Chiu, T. K. F. (2025). The impact of TPACK on teachers' willingness to integrate generative artificial intelligence (GenAI): The moderating role of negative emotions and the buffering effects of need satisfaction. *Teaching and Teacher Education*, *154*, Article 104877. https://doi.org/10.1016/j.tate.2024.104877

Zembylas, M. (2005). *Teaching with emotion: A postmodern enactment*. Information Age Publishing.

Zembylas, M. (2007). Emotional capital and education: Theoretical insights from Bourdieu. *British Journal of Educational Studies*, *55*(4), 443–463. https://doi.org/10.1111/j.1467-8527.2007.00390.x

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