



Balancing Technology Innovation and Human Interaction: Digital Pedagogy in TESOL

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Abstract

Digital technologies have reshaped Teaching English to Speakers of Other Languages (TESOL) by expanding access, enabling personalized learning, and offering multimodal resources. Yet an overreliance on technology risks weakening the interpersonal and communicative core of language learning. This article examines the tensions and complementarities between technology-driven innovation and human-centered interaction in TESOL. It synthesizes current literature on digital pedagogy, discusses pedagogical frameworks that integrate technology without displacing relational teaching, considers practical strategies for teacher development and classroom design, and offers recommendations for research and policy.

1. Introduction

Digital tools—learning management systems (LMS), video conferencing, computer-assisted language learning (CALL), adaptive software, chatbots, and mobile apps—have transformed the practice of Teaching English to Speakers of Other Languages (TESOL). They expand access, personalise learning, and enable multimodal input. Yet language learning remains fundamentally social: interaction, negotiation of meaning, affect, and cultural mediation are central to developing communicative competence (Long, 1996; Vygotsky, 1978). Effective digital pedagogy reconciles technological affordances with a commitment to human interaction rather than privileging one over the other. This article articulates guiding principles and actionable strategies for balancing technological affordances with the relational, interactional work of TESOL professionals.

2. Conceptual Framing: Digital Pedagogy and Human Interaction

Language learning is fundamentally social: it requires meaningful interaction, negotiation of meaning, and responsive feedback (Long, 1996; Vygotsky, 1978). Modern digital tools—learning management systems, adaptive platforms, conversation bots, corpus tools, and mobile apps—offer affordances for individualised practice, data-driven diagnostics, and multimodal input (Godwin-Jones, 2018). However, technology can fragment communicative contexts, reduce opportunities for spontaneous negotiation, and shift teacher roles in ways that may diminish human responsiveness unless carefully designed (Kern, 2006). Recent systematic evidence suggests that the evolution of technology in language pedagogy has followed a trajectory from text-based computer-mediated communication to AI-driven immersive environments, with a corresponding shift from descriptive case studies to experimental, data-driven research designs (Alrefaee & Al-Shammari, 2026). Yet this same research reveals persistent geographic and linguistic biases toward Western, English-dominant contexts, raising

critical questions about the cross-cultural applicability of existing technological frameworks for pragmatic development. The challenge is to harness technological affordances to support, not replace, pedagogically rich human interaction while ensuring that digital innovations are culturally adaptive and equitable across diverse learning contexts (Alrefaee & Al-Shammari, 2026).

Digital pedagogy is more than tools. It refers to the principles and practices guiding pedagogical choices when using digital technologies (Selwyn, 2016), foregrounding learner agency, critical digital literacies, and reflective teacher decision-making. Digital tools can increase comprehensible input and opportunities for output, but must be designed to promote interactionally rich, meaningful practice.

Additionally, sociocultural and interactionist perspectives offer frameworks that foreground the social nature of language acquisition, the role of scaffolding, and the need for meaningful communication (Lantolf & Thorne, 2006; Long, 1996). Language develops through socially mediated interaction, and technology can mediate but not replace the joint attention, scaffolding, and corrective feedback provided by skilled interlocutors.

Moreover, ecological approaches place technology within a learning ecology in which human agents, artifacts, and contexts interact dynamically (Nardi, 1996), helping to avoid deterministic assumptions that technology alone drives outcomes. Multimedia and interactivity can enhance learning but risk cognitive overload, so instructional design must manage intrinsic and extraneous load.

Overall, technology supports distributed participation but requires facilitation to cultivate authentic communicative practices and identity work.

3. Principles for Balanced Digital Pedagogy in TESOL

A balanced approach rests on five interrelated principles. First, pedagogical purpose should drive technological choice: tools must align with communicative tasks and learning outcomes rather than being used for novelty's sake (Hockly, 2018). Second, technology should amplify opportunities for interaction—synchronous and asynchronous—rather than substitute for them; for example, video-conferencing can extend real-time conversation practice, while collaborative documents scaffold joint meaning-making (Kern & Warschauer, 2000). Third, teacher mediation remains central: instructors should design tasks, interpret learner data, and provide responsive feedback that machines cannot authentically provide (Bax, 2011a). Fourth, equity of access and digital literacy are ethical prerequisites: institutions must address access gaps and scaffold learners' and teachers' competencies with technology (Selwyn, 2016). Fifth, reflective practice and continual evaluation should guide technology integration, informed by both quantitative learning analytics and qualitative classroom observation (Graham, 2019).

4. Designing Interaction-Rich Digital Tasks

Task design mediates the balance between technology and human interaction. Well-designed tasks situate learners in authentic communicative contexts, require negotiation of meaning, and promote reflective output. For synchronous interaction, small-group video breakout activities with structured roles (e.g., information-gap interviews, problem-solving tasks) preserve interactivity while leveraging digital tools for materials and recording. Asynchronous interaction benefits from threaded discussions, voice-recorded peer feedback, and multimodal projects in which students co-construct meaning using shared digital artifacts (Warschauer & Kern, 2000). Adaptive drills and pronunciation apps serve formative practice but should be embedded within tasks that require learners to use practised forms in communicative exchanges with peers and teachers (Doughty & Long, 2003).

Benefits of Technology in TESOL

The benefits of technology in TESOL include, but are not limited to, the following:

- Increased access and flexibility: online and blended models of education extend instruction to remote learners, nontraditional schedules, special circumstances, and adult education contexts (Benson, 2011).
- Personalisation and adaptive feedback: intelligent tutoring systems and adaptive platforms can provide scaffolded practice aligned to learner profiles and linguistic needs and goals, including individualised feedback for improvement and projected timelines to achieve learning aims (Heift & Schulze, 2007).
- Rich multimodal input: video, audio, and interactive media expose learners to varied accents, registers, and cultural contexts, widening their perspectives and linguistic repertoire (Kern, 2006).
- Data-informed instruction: learning analytics can inform targeted interventions, small-group instruction, individualised assessment, and curricular adjustments to better serve students' academic needs (Siemens & Baker, 2012).

Risks and Limitations

- Reduced interpersonal affordances: over-reliance on asynchronous or automated interactions can erode opportunities for negotiation of meaning, immediate feedback, and socio-emotional support (Darhower, 2013).
- Equity and access gaps: digital divides in hardware, connectivity, and digital literacy exacerbate existing educational inequities (Van Dijk, 2020).
- Pedagogical mismatch: technology-driven activities that prioritise gamification or discrete-item drilling may neglect higher-order communicative goals (Bax, 2011b).
- Teacher workload and skills: effective integration requires teacher time, training, and ongoing professional learning (Koehler & Mishra, 2009).

5. Principles for Integrating Technology while Preserving Human Interaction

1. Pedagogy-first decision making: choose technologies to serve specific communicative learning goals; avoid technology for its own sake (Ertmer & Ottenbreit-Leftwich, 2010).
2. Preserve synchronous, meaning-focused interaction: use live sessions for negotiation of meaning, fluency practice, and socio-emotional support, while leveraging asynchronous tools for practice and reflection.
3. Design for community and presence: apply community-of-inquiry constructs—teaching presence, social presence, cognitive presence—to ensure learners feel connected (Garrison, Anderson, & Archer, 2000).
4. Scaffold human–technology ecologies: combine automated feedback with teacher-mediated feedback loops—for example, learners complete adaptive exercises, then discuss errors and strategies in teacher-led sessions.
5. Centre equity and access: employ low-bandwidth, accessible design; provide device-agnostic materials and alternatives; embed digital-literacy supports.
6. Make assessment authentic and multimodal: use portfolios, performance tasks, and teacher-assessed speaking interactions alongside automated diagnostics.

However, it is essential to acknowledge that the above recommendations require adaptation across different educational contexts, including K–12, adult education, and higher education.

Principles for Adaptation (Applies Across Contexts)

- Context analysis: assess learners' prior knowledge, motivation, access to resources, instructional time, and assessment systems (Darling-Hammond et al., 2020).

- Student-centred design: align learning tasks to authentic goals and scaffold supports so learners can progress from guided practice to independent mastery (Bransford, Brown, & Cocking, 2000).
- Equity and access: intentionally remove barriers to participation (technology, language, disability) and provide culturally responsive materials (Ladson-Billings, 1995).

K–12: Developmentally Appropriate and Scaffolded

- Strategy emphasis: use explicit instruction, frequent formative checks, multimodal materials, and structured collaborative activities. Break complex tasks into smaller steps with clear success criteria (Hattie, 2009).
- Classroom management and routines: embed predictable routines and visual supports; differentiate through tiered assignments and small-group instruction.
- Assessment and accountability: use short-cycle formative assessments to inform instruction and provide timely feedback; align tasks to grade-level standards and IEP/504 accommodations where applicable (Black & Wiliam, 1998).
- Example adaptation: a project-based unit should include teacher-modelled exemplars, checkpoints with rubrics, and family-facing communication templates to support home scaffolding (Thomas, 2000).

Adult Education: Relevance, Autonomy, and Flexible Delivery

- Strategy emphasis: connect learning to adults' goals and prior experiences; prioritise problem-centred tasks and immediate applicability (Knowles, Holton, & Swanson, 2015). Adults benefit from choice, self-directed learning opportunities, and flexible pacing.
- Instructional design: use workplace simulations, case studies, and peer learning communities. Reduce emphasis on high-stakes testing in favour of competency demonstrations and portfolios.
- Accessibility and scheduling: offer blended or asynchronous options and clear signposting of time demands to accommodate work and family constraints. Provide optional micro-credentials or stackable modules for incremental certification.
- Example adaptation: convert a multi-week teaching-strategy course into modular micro-units with practical templates, evening synchronous Q&A sessions, and an applied capstone tied to learners' contexts.

Higher Education: Analytical Rigor, Independence, and Research Orientation

- Strategy emphasis: foster higher-order thinking, disciplinary habits of mind, and research skills. Use seminars, project-based learning, and scaffolded writing and research tasks that increase in complexity over time.
- Assessment and feedback: emphasise rubrics, peer review, formative drafts, and opportunities for revision. Align assessments with disciplinary standards and authentic scholarly practices.
- Academic support: provide structured office hours, learning analytics to identify struggling students, and linked academic support (writing centres, tutoring). Maintain academic integrity through authentic assessments and clear expectations.
- Example adaptation: a course could replace multiple-choice exams with iterative research projects, milestone checkpoints, and publication-style presentations.

6. Generative AI and TESOL Practice: Affordances, Implications, and Pedagogical Integration

The rapid development of generative AI—especially large language models (LLMs) and conversational agents such as ChatGPT—creates new opportunities and challenges for TESOL. Three high-leverage affordances of generative AI for language learning include, but are not limited to, authentic output generation (e.g., emails, dialogues, narratives, and role-play prompts aligned to learner proficiency levels), personalised feedback, and scaffolded practice. Generative AI can create scaffolded sequences that progressively reduce support—worked examples, guided practice, and independent tasks—tailored to learner needs and pacing. LLMs can analyse learner texts and speech transcripts to identify surface-level errors (grammar, vocabulary) and higher-level elements (cohesion, discourse organisation), offering immediate, individualised feedback at scale (Bender et al., 2021).

Implications for TESOL Practice: Pedagogy and Curriculum Design

- Task redesign: incorporate AI as an authentic tool in task-based language teaching (TBLT). Tasks should require learners to critically use AI outputs (e.g., evaluate, edit, or adapt AI-generated texts).
- Higher-order skills: emphasise skills that AI performs poorly—critical thinking, intercultural competence, multimodal literacies, and oral fluency with spontaneous negotiation (Sherman & Lombrozo, 2024).
- Assessment alignment: revisit assessment tasks to ensure they measure communicative competence rather than the ability to use AI tools; design prompts that require process documentation or in-class demonstrations (Godwin-Jones, 2021).

Assessment and Academic Integrity

- Rethink reliability: AI makes producing polished text easier, complicating writing assessment. Use process-based assessment (portfolios, drafts, revisions, in-person speaking) and require annotated AI-use logs when appropriate.
- Promote ethical use: teach students transparent practices for using AI—citation of AI assistance, declaration of edits, and reflective rationale for accepting or rejecting AI suggestions (Li & Hegelheimer, 2020).

Generative AI offers TESOL teachers powerful affordances—authentic output generation, personalised feedback, and scaffolded practice—that can enhance instruction when integrated thoughtfully. Successful use depends on teacher expertise in prompt design, critical vetting of outputs, ethical guidance, and assessment redesign to preserve valid measures of language competence (Reck & Kohnke, 2023). With careful implementation and ongoing professional learning, AI can become a valuable co-pilot in language teaching rather than a replacement for teacher judgement.

7. Teacher Roles and Professional Development

Digital pedagogy reconfigures teacher roles from sole knowledge providers to designers, facilitators, and interpreters of data. Teachers must learn to orchestrate hybrid interaction—deciding when to use automated practice, when to scaffold peer work, and when to intervene in live exchanges. Effective professional development pairs technical training with pedagogical modelling, co-planning, and reflective cycles. Peer observation and micro-teaching in blended settings help teachers refine strategies for maintaining presence and scaffolding in online and face-to-face interactions (Belfield & Levin, 2007). Moreover, teachers need competencies in interpreting learning analytics to identify interactional breakdowns that require human intervention (Siemens & Long, 2011).

8. Practical Strategies for TESOL Teachers

- Blended task cycles: pre-teach vocabulary via short micro-lessons or adaptive apps; use synchronous class time for communicative tasks requiring negotiation and feedback; assign reflective journals or multimodal projects asynchronously.
- Structured peer interaction online: create small breakout groups with clear roles, prompts emphasising information gaps, and teacher monitoring to ensure meaningful negotiation.
- Integrated corrective feedback: use automated pronunciation or grammar tools for immediate practice, but schedule targeted teacher feedback sessions focused on patterns and uptake.
- Multimodal portfolios: encourage learners to collect audio, video, written, and project artifacts to document growth; teachers use portfolios in conferences to provide personalised guidance.
- Low-tech alternatives: for learners with limited bandwidth, employ SMS-based prompts, audio-only tasks, printable materials, and asynchronous voice recordings.
- Critical digital literacy lessons: teach students to evaluate online language resources, understand data-privacy implications, and reflect on how technology shapes communication.

9. Professional Development and Institutional Supports

- Focus professional development sessions on practices, not just tools: workshops should model blended lesson design, facilitation of online interaction, assessment of multimodal work, and strategies for including multilingual learners at all levels.
- Mentoring and communities of practice: pair experienced blended instructors with novices; support teacher inquiry groups to iterate on design and share evidence.
- Time allocation and workload recognition: institutions must account for the additional planning and feedback time that blended digital pedagogy requires.
- Infrastructure and policy: provide reliable platforms, device-loan programmes, and clear policies on data privacy, accessibility, and acceptable use.

10. Assessment and Feedback

Assessment practices should capture communicative competence across modalities. Automated scoring systems and analytic dashboards provide rapid, objective measures of discrete skills (e.g., vocabulary size, pronunciation features), but they cannot fully assess pragmatic competence, interactional repair, or intercultural nuance. Combining automated diagnostics with teacher-led performance assessments—such as assessed role-plays, oral interviews, and evaluated collaborative projects—yields a more complete picture. Feedback should be timely and dialogic: teachers use data from technology to inform personalised conferencing, targeted mini-lessons, and guidance on interactional strategies (Norris & Ortega, 2000).

Assessment and Quality Assurance

- Align assessments to communicative outcomes: prioritise performance-based assessments that capture interactional competence (e.g., role-plays, oral presentations, collaborative projects).
- Use mixed-method evaluation: combine automated metrics (task completion, error patterns) with teacher-rated rubrics and learner self-assessment to obtain a holistic view.
- Evaluate interactional quality: observe or record synchronous activities to analyse the quantity and quality of negotiation of meaning, uptake, and feedback cycles.

11. Case Examples (Illustrative)

- Blended ESL/ENL adult literacy programme: adaptive literacy modules deliver individualised practice; weekly face-to-face or synchronous small groups focus on conversational competence, job-specific language, and confidence-building.
- Virtual seminars: asynchronous readings and discussion boards scaffold discipline-specific writing; synchronous seminars emphasise peer feedback, oral presentations, and critical discussion. (Implementation details should be adapted to local contexts and resource constraints.)
- Case vignettes: a community college TESOL programme replaced some in-class drills with an adaptive vocabulary platform but required students to use learned vocabulary in weekly, teacher-facilitated conversation circles carried out in person or via synchronous video. Teachers used platform analytics to identify lexical items needing reinforcement and designed communicative tasks targeting those items; students reported greater confidence in using new words in interaction, suggesting that technology-supported practice combined with structured human interaction promotes transfer. Another university programme used AI conversation partners for controlled speaking practice; instructors reviewed transcripts and selected interactional moments for class-based analysis, combining the efficiency of automated practice with teacher-led discourse analysis. These vignettes illustrate the complementary roles of automation and human mediation.

12. Equity, Access, and Ethical Considerations

Digital inclusion is central to ethical TESOL practice. Policymakers and programme leaders should provide opportunities for device access, reliable connectivity, and learner digital literacy. Furthermore, privacy and data security are critical; institutions should adopt transparent policies about data collection, storage, and use, and teachers must educate learners on digital citizenship. Culturally responsive pedagogy requires that technological tools be evaluated for cultural biases and adapted to honour learners' linguistic identities and communicative norms (Cummins, 2001).

13. Empirical Evidence and Outcomes

Studies show mixed outcomes: blended instruction often improves access and student engagement and can produce gains in specific measured skills, but its effects on communicative competence depend on the extent to which interactional practice is preserved (Means et al., 2013). Research in Computer-Assisted Language Learning (CALL) indicates that technology-mediated interaction can foster negotiation of meaning and uptake when tasks are meaning-focused and when teacher mediation supports feedback cycles (Sullivan & Pratt, 1996). Conversely, programmes that prioritise isolated computerised exercises without integration into communicative activities show limited transfer to real-world communication (Nation, 2001).

14. Recommendations for Program Leaders

Leaders should adopt a strategic framework: (1) start with learning goals and map where technology enhances or enables interactional practices; (2) pilot tools in small-scale blended designs emphasising teacher–student and peer interaction; (3) invest in sustained professional development that centres pedagogy, not only tools; (4) monitor outcomes using mixed-methods evaluation that includes interactional quality measures (e.g., frequency of negotiation moves, complexity of output) alongside standard achievement metrics; and (5) ensure infrastructure and policy support for equitable access, privacy, and culturally responsive materials.

Furthermore, adaptive technologies—including speech-generating devices, literacy apps with adjustable scaffolds, and AI-driven feedback systems—are increasingly used to support communicative development across ages and abilities. However, outcomes vary widely. A more nuanced and focused research agenda is needed to clarify how teacher interventions

(instructional strategies, scaffolding, modelling, and fidelity of implementation) mediate the effects of adaptive technologies on communicative outcomes.

Some potential key research questions include the following:

- What specific teacher behaviours (e.g., explicit modelling, contingent feedback, prompting, and reinforcement) strengthen the impact of adaptive technologies on expressive and receptive language outcomes?
- How does teacher training and ongoing coaching influence fidelity of adaptive-technology implementation and subsequent communicative gains?
- Which student characteristics (e.g., age, baseline language level, disability type, socio-cultural-linguistic background) moderate the mediation pathway between adaptive-technology use and communicative development?
- How do classroom versus one-to-one instructional contexts change the mediating role of teacher interventions?
- What dosage and timing (frequency, intensity, duration) of teacher-mediated use of adaptive technology produce sustainable communicative development?

15. Challenges and Future Directions

Challenges include the temptation to scale down teacher involvement for cost savings, the risk of privileging measurable discrete outcomes over nuanced communicative competence, and emerging ethical dilemmas around AI-generated content and learner surveillance. Future research should examine how multimodal interaction patterns in blended environments correlate with long-term communicative outcomes, and how teacher interventions mediate the relationship between adaptive technologies and communicative development. Cross-disciplinary collaborations between applied linguistics, learning sciences, and human-centred AI design hold promise for tools that better support dialogic learning rather than merely automating practice.

Additionally, blended learning environments increasingly combine face-to-face, synchronous online, and asynchronous multimodal channels (e.g., text, audio, video, gesture, annotation). Short-term studies document moment-to-moment multimodal affordances and immediate learning effects, but a critical gap remains: longitudinal evidence linking interaction patterns across modalities to sustained communicative competencies (e.g., discourse coherence, pragmatic flexibility, collaborative problem-solving, disciplinary communication) over months or years is lacking. Longitudinal research can reveal developmental trajectories, stability or change in modality use, delayed effects, and contextual moderators (age, discipline, technology literacy, instructor practices). Longitudinal, mixed-methods studies that connect fine-grained multimodal interaction patterns in blended learning to long-term communicative outcomes are essential to move beyond short-term efficacy claims and to build robust evidence guiding equitable, sustainable blended-learning design.

16. Conclusion

Balancing technology innovation with human interaction in TESOL is not an either/or proposition. Technology can amplify reach, provide personalised practice, and supply rich input, but language learning's social core requires sustained, skilled human interaction. Thoughtful digital pedagogy places communicative goals, equity, and teacher agency at the centre—using technology to extend, not replace, the relational work of language teaching.

Effective TESOL in the digital age requires balancing technological innovation with deliberate support for human interaction. When pedagogical aims drive tool selection, and teachers retain primary responsibility for relational, ethical, and interpretive work, technology can amplify opportunities for practice, feedback, and authentic exchange without displacing the centrality of human-mediated interaction. Implementing this balance demands coherent

curriculum design, equity-focused infrastructure, sustained professional learning, and ongoing local research.

A balanced digital pedagogy in TESOL treats technology as a means of amplifying meaningful interaction rather than as a substitute for it. Pedagogical intentionality, teacher mediation, equitable access, and reflective evaluation are essential. When integrated thoughtfully, technology can expand opportunities for practice, personalise support, and provide data to inform instruction—while human interaction remains the engine that drives communicative competence. Programme leaders and teachers who prioritise interactional quality while leveraging technological affordances are best positioned to prepare learners for the communicative demands of an increasingly digital world.

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