

ARTICLE



GenAI-mediated activity theory (GMAT) for L2 teachers

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Abstract

This study proposes the GenAI-Mediated Activity Theory (GMAT) as a conceptual framework for understanding how generative AI (GenAI) reshapes second language (L2) teachers' teaching preparation and practices within complex pedagogical ecosystems. Methodologically, the paper adopts a model-building approach. It recontextualizes and synthesizes conceptual elements from Engeström's (1999) expanded Activity Theory (AT) to construct the model. Thus, the study illuminates the evolving role of L2 teachers as adaptive, multi-positional agents of teaching. Specifically, teachers may adopt GenAI to refine instructional goals, co-create pedagogical content, negotiate ethical guidelines, and participate in collaborative professional networks. While previous AT-based studies have primarily examined how technologies mediate components within an activity system, the GMAT model contributes this work by theorizing how GenAI contributes to the evolution of sociotechnical and pedagogical ecosystems in L2 education. Furthermore, the study outlines concrete pedagogical implications by examining how specific triadic relationships among the components interact to generate new GenAI-mediated instructional environments. Overall, the GMAT model provides both a theoretical and practical foundation for guiding instructional design and teacher development in the era of GenAI-enhanced education.

Keywords: activity theory; generative AI; L2 teacher; teacher agency; teacher identity

Language(s) Learned in This Study: English

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Introduction

The recent emergence of generative AI (GenAI) has dramatically changed the landscape of second language (L2) education (Lee et al., 2025a; Moorhouse, 2024). These tools provide L2 teachers with new opportunities to create innovative instructional materials, offer personalized feedback, and provide adaptive learning experiences for their learners (e.g., Jeon et al., 2023; Lin & Chen, 2024). However, despite such empirical studies on GenAI in L2 classrooms, comprehensive frameworks remain limited. More conceptual work is needed to explain how GenAI mediates teachers' pedagogical decision-making, tool use, and identity formation within broader sociotechnical and pedagogical environments (Chen et al., 2026; Darvin, 2025; Kohnke et al., 2024).

In this context, Activity Theory (AT) provides an effective framework for exploring the educational affordances and potential of GenAI-mediated L2 instruction. From a perspective of the Vygotskian sociocultural theory, AT conceptualizes L2 teaching as a form of purposeful human action and a socioculturally mediated practice (Lantolf & Thorne, 2007). Specifically, it views language learning and teaching as deeply rooted in sociocultural and pedagogical ecosystems evolving through the interface of subjects, objects, mediating artifacts, rules, communities, and division of labor (Engeström, 1999). In this light, several studies have applied the AT framework to explore L2 teaching with emerging digital

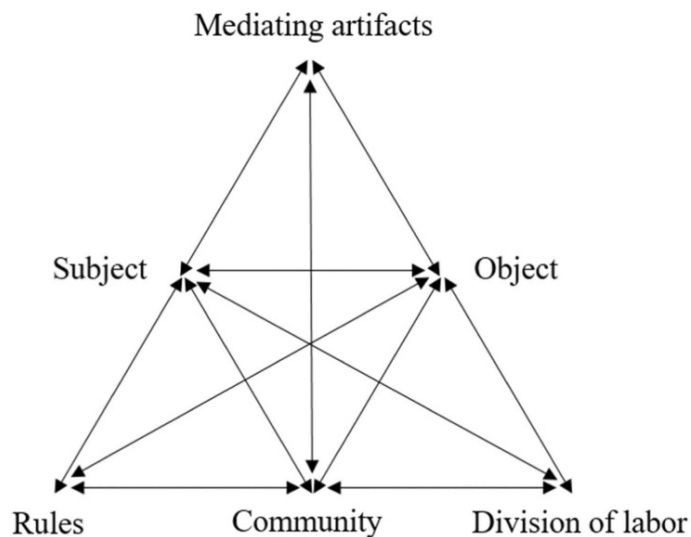
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technologies (e.g., Blayone, 2019; Nguyen & Le, 2025). However, most of them were conducted before the emergence of GenAI technology or mainly focused on single technological tools. Since GenAI contains a variety of multimodal tools, and is subject to continuous model updates and versioning, traditional AT frameworks may not fully capture the dynamic and reciprocal relationship between human teachers and evolving technologies. As such, a GenAI-based conceptual model is required to account for the emergent relationships between human teachers and GenAI.

To address this gap, the present study proposes the GenAI-Mediated Activity Theory (GMAT) framework. Using Engeström's (1999) expanded AT framework (see Figure 1), this framework identifies key components (i.e., mediating artifact, subject, object, rules, community, division of labor) mediated by GenAI and aims to illustrate how these elements dynamically interact in the process of GenAI-mediated L2 teaching. To situate the GMAT framework within pedagogical contexts, this study applies this model to GenAI-mediated L2 instruction implemented by in-service teachers. Thus, the scope of this study focuses on in-service L2 teachers across primary to tertiary education contexts. Drawing on the sociocultural orientation adopted in Activity Theory, the term L2 is used broadly in this study to reflect socioculturally driven constructs, encompassing English as a Foreign Language (EFL), English as a Second Language (ESL), and other multilingual contexts (Douglas Fir Group, 2016). While most examples in this study focus on EFL, the GMAT framework's conceptual and analytical propositions apply to other L2 learning contexts. Therefore, the terms *L2 teachers* or *L2 instruction* are used consistently throughout this paper unless a specific context requires EFL or ESL. By developing such a model, this study aims to offer a holistic approach to L2 teachers' practices and challenges in the GenAI era, contributing theoretically and pedagogically to the field.

Figure 1

Expanded Activity System Model (Engeström, 1999)



Activity Theory for L2 Teachers in Digital Contexts

The expanded AT model provides a strong theoretical and pedagogical framework for L2 teacher preparation and practice by examining the dynamic interactions within teaching environments. Specifically, it helps explore how teachers navigate, negotiate, and transform their professional identities and roles within their local teaching contexts (Johnson & Golombek, 2016). L2 teachers' actions, beliefs, and knowledge are situated within broader activity systems shaped by institutional rules, community norms, mediational tools, and evolving pedagogical goals (Feryok, 2009; Tasker, 2014). For example,

Karimi and Mofidi (2019) adopted the expanded AT model to explore Iranian EFL teachers' identity development. This study revealed that identity development is not linear; instead, it emerges as dynamically constructed within the broader structure of activity systems. Moreover, the dialectical tensions between imposed curricula and personal teaching philosophies are critical in enabling new teaching roles and the (re)construction of L2 teachers' identities. Importantly, rather than viewing such tensions as barriers, AT frames them as opportunities for transformative teaching, through which teachers critically reflect on and reconfigure their instructional practices (Engeström & Sannino, 2010).

With the emergence of digital technologies in instructional settings, it is essential to reconsider how teachers experience and respond to these changes through the lens of AT (Blayone, 2019). In fact, the AT framework serves as a valuable framework for understanding L2 teachers in digital contexts, offering insights into how they adapt their instructional beliefs and practices when engaging with new technologies. For example, Kitade (2015) found that teachers build their sense of agency by working through social and cognitive challenges with technology. Unlike other approaches that concentrate only on what teachers think or how they use digital tools in a classroom, AT focuses on how teachers interact with tools, rules, and the school community within the ecology of teaching (Rückriem, 2009). This broader view helps researchers understand how teaching practices change over time and through everyday decisions, challenges, and collaborations in contexts where teachers and technologies are embedded in tandem (Issroff & Scanlon, 2002). As new digital tools become increasingly available and are widely used, AT offers a flexible and practical way to explore how teachers adjust, make sense of, and use these tools in their pedagogical and instructional ecosystems (Lee & Jeon, 2024).

Although many studies have examined technology-integrated L2 teaching, they often view digital tools as relatively fixed mediational tools (Blayone, 2019). Most existing studies focus on teacher identity changes or practices when using technology without completely understanding the evolving nature of emerging technologies (Rückriem, 2009). This gap becomes evident, especially in the era of GenAI, where tools do more than merely support instruction, playing an active role in the construction of knowledge with teachers (Moorhouse, 2024). Therefore, GenAI tools extend pedagogical practices and reconfigure the entire activity system, affecting teachers' roles, the nature of objects, the division of labor, and the perceived distribution of agency within the educational community (Lee et al., 2025a; Li et al., 2025).

In the era of GenAI-mediated instruction, L2 teaching involves numerous artifacts and social factors. Artifacts can include digital tools such as GenAI programs and platforms and related digital technologies, which mediate how teachers prepare, perform, and reflect on instruction (Dolata et al., 2023). Social factors refer to the institutional norms, peer collaboration, and classroom dynamics that shape how teachers interpret and integrate these tools into practice (Essien et al., 2024). As these elements highlight that GenAI-mediated instruction is not only technical adoption but also a socially situated practice, AT can offer a useful framework for examining how L2 teachers engage in GenAI-mediated teaching through their interactions with these artifacts and social dynamics (Li et al., 2025; Woo et al., 2025; Yao et al., 2025). However, despite its insights into L2 teaching, the traditional AT framework offers limited explanation of GenAI-mediated environments, where instructional activities continue to be reshaped through human–AI interaction and multimodal meaning-making. Therefore, extending existing AT frameworks is necessary to conceptualize GenAI-mediated instruction as an evolving ecological system constituted by interdependent relations among teachers, tools, instructional goals, and educational communities.

Despite its growing importance, few studies have systematically employed AT to theorize L2 teachers' dynamic engagement with GenAI. For example, Alsalem (2024) adopted AT to examine EFL teachers' perceptions of the GenAI tool and mapped a teacher's role within the division of labor component, reporting that teachers viewed GenAI strictly as a supplementary tool rather than a collaborative partner. However, this approach does not fully account for theorizing the dynamic co-evolution where the

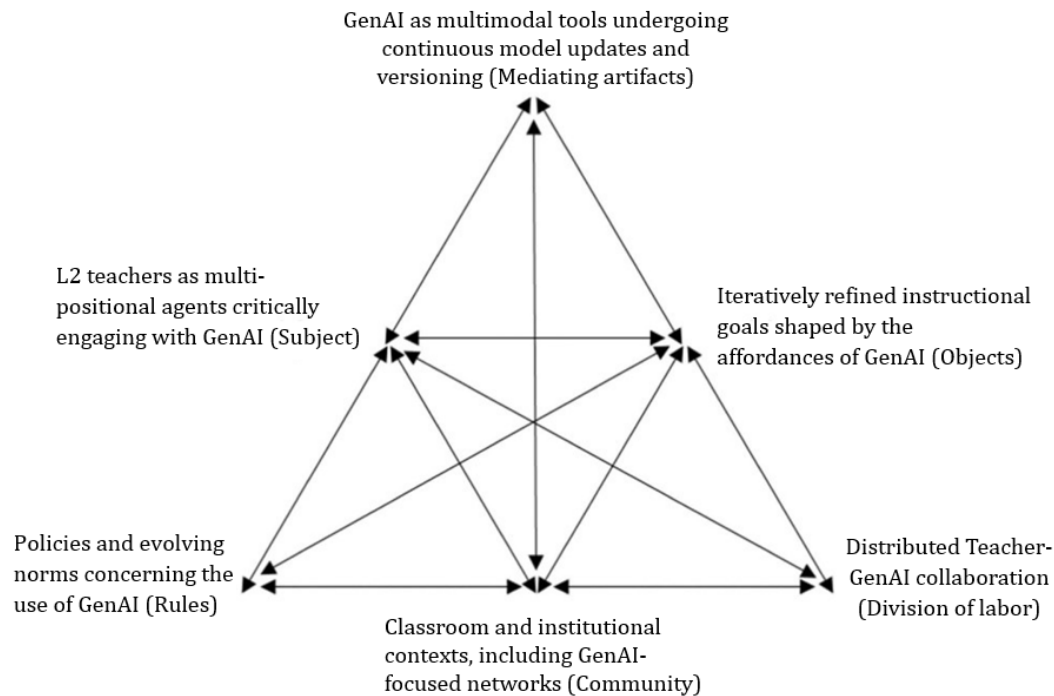
teacher's professional identity is reshaped by the generative capabilities of the GenAI tool. Consequently, previous studies mainly focus on either the technical efficiency of the tools or learner's language development, often overlooking the broader systems of mediation in which teachers' pedagogical practices and decisions are shaped by their interaction with GenAI. Therefore, a more comprehensive framework is necessary to outline how L2 teachers interact with GenAI as part of a broader ecological system, where their practices are mediated by multiple influencing factors. Specifically, there should be a theoretical scaffold for understanding how L2 teachers evolve with GenAI within complex activity systems, interact with institutional rules, collaborate with communities, and constantly (re)construct their professional identities and teaching goals.

GenAI-Mediated Activity Theory (GMAT) for L2 Teachers

This section elaborates on how each component of Engeström's (1999) activity theory system is reconceptualized through the GMAT framework (see [Figure 2](#)).

Figure 2

GenAI-Mediated Activity Theory (GMAT) for L2 Teachers



Subject: L2 Teachers as Multi-positional Agents Critically Engaging with GenAI

In the traditional AT model, the subject refers to the agent of the activity. In the GMAT framework, L2 teachers as subjects are no longer positioned solely as implementers of tools, but as multi-positional agents who critically engage with GenAI to create, revise, and personalize instructional content (Lee et al., 2025a; Moorhouse, 2024). Such a theoretical stance is supported by recent empirical data; for example, Lin et al. (2025) observed that as teachers interacted with GenAI, they fluidly shifted between roles, acting as evaluators of GenAI output, co-designers of prompts, and pedagogical decision-makers. This process fosters professional agency, as teachers co-create pedagogical artifacts with technology (Lee et al., 2025a). Rather than simply adopting GenAI-generated materials, teachers iteratively collaborate with GenAI tools, participating as prompt designers, resource evaluators, and ethical mediators (Ahn et

al., 2024; Crosthwaite & Baisa, 2023).

GMAT sheds new light on emergent literacy skills in relation to L2 teachers' agency as they adopt multi-positional roles in GenAI-mediated teaching contexts. The first of these skills is prompt literacy, defined as the ability to create and revise effective prompts that guide GenAI toward pedagogically appropriate responses and to collaborate with GenAI (Hwang et al., 2023; Hwang et al., 2025b). With this skill, teachers can strategically design and iteratively refine prompts, and critically evaluate GenAI-generated outputs for instructional use (Hwang et al., 2025b; Hwang & Lee, 2025). Second is evaluation literacy, which enables teachers to critically assess whether GenAI-generated teaching materials are linguistically accurate, contextually appropriate, and instructionally effective (Shin et al., 2025). Last is data ethics literacy, which helps teachers ensure that GenAI use aligns with principles of transparency, privacy protection, and academic integrity (Laine et al., 2025). These emerging literacies collectively redefine L2 teachers as reflective and ethically responsible agents who balance creativity, critical awareness, and technological affordances when engaging with GenAI in their teaching preparation and practice.

Mediating Artifacts: GenAI as Multimodal Tools Undergoing Continuous Model Updates and Versioning

Within traditional AT frameworks, mediating artifacts are typically understood as tools that facilitate human activity. Yao et al. (2025), who adapted the AT framework to examine teachers' use of a GenAI-based chatbot for providing feedback on L2 writing, conceptualized mediating artifacts as AI-guided chatbots. While not conceptually distinct, the GMAT framework proposes a broader term, GenAI, which encompasses not only text-based programs such as ChatGPT (OpenAI, 2024) but also multimodal GenAI platforms that support image or video generation (Hwang & Lee, 2025). Importantly, GenAI also connects to the field of digital multimodal composing, where learners create meaning by combining linguistic, visual, spatial, and auditory modes (Hafner, 2015; Hafner & Ho, 2020; Yang, 2012; Yu et al., 2026). Recent studies show that GenAI can act as a multimodal co-designer, helping learners generate, modify, and combine multimodal materials in ways that reflect well-known theories of multimodality (Hwang et al., 2025a; Moorhouse, 2024; Zhan et al., 2023). Here, GenAI-assisted digital multimodal composing is not simply a digital extension of writing. Rather, it is a broader meaning-making process that allows L2 learners to work with multiple semiotic resources (see Ci & Jiang, 2025 for a systematic review), supported by a range of multimodal GenAI tools.

Previous AT models have often conceptualized technological tools as fixed mediational artifacts. However, within GMAT, GenAI challenges this assumption of fixity. As an evolving system, GenAI continuously expands its affordances through ongoing version updates and model refinements. Recent advances, as mentioned above, have expanded GenAI's multimodal capacity (Liu et al., 2024), and thus broaden its pedagogical potential in L2 contexts. Importantly, phenomena such as version updates and model refinement underscore that GenAI cannot be treated as a fixed artifact. That is, each update and refinement may alter how users engage with the tool, reshape established routines, and reconfigure the distribution of agency within GenAI-mediated activity systems. For example, Hwang et al. (2025a) noted that earlier GenAI-based image generators required a fixed seed number to maintain consistency, whereas more recent versions achieve coherence without this constraint. Such technical advancements may influence not only users' interaction patterns but also the rules and social negotiations surrounding GenAI use within the target community.

Objects: Iteratively Refined Instructional Goals Shaped by the Affordances of GenAI

Considering the existing literature on GenAI-supported L2 instruction, this section proposes a range of objects that L2 teachers could establish. Notably, the object, as a component in the current model, may shape and influence all other components (i.e., subject, mediating artifact(s), rules, community, and division of labor), which, in turn, could reciprocally affect the purposeful activity system. In the GMAT framework, the object, defined as the purpose or goal of the activity, is no longer static; instead, GenAI enables the pursuit of diverse and emergent instructional objectives. Although we aim for

comprehensiveness, the list of objects provided below may not exhaustively cover all possible uses of GenAI in L2 instruction.

First, L2 teachers can use GenAI to generate instructional materials and resources. These materials and resources may range from chatbots that could be used as a speaking practice partner (e.g., Lee et al., 2024), story (texts) for L2 reading lessons (e.g., Kohnke et al., 2023; Lee et al., 2023), listening practice materials (e.g., Ahn et al., 2024), to videos or songs (Moorhouse, 2024).

Second, L2 teachers can utilize GenAI to generate assessment or testing items, a practice known as automated item generation. Although the concept of automated item generation dates back over 50 years (Bormuth, 1969), GenAI-generated items have only recently reached sufficient quality for practical use, owing to advancements in related technologies (Shin & Lee, 2024). Recent research (e.g., Bui & Barrot, 2025; Lin & Chen, 2024; Shin & Lee, 2023; Shin et al., 2025) has explored the potential of GenAI-driven automated item generation using various methodologies, demonstrating that GenAI can generate language-testing items with high reliability, although these items require some degree of revision by human teachers (e.g., Lin & Chen, 2024; Shin & Lee, 2023).

Third, as providing feedback on students' linguistic output (e.g., essays) can pose immense challenges and workload issues for L2 teachers (Junqueira & Payant, 2015; Yu, 2021), automated feedback tools have been considered useful resources for these educators (e.g., Jiang & Yu, 2022; Link et al., 2022; Ranalli, 2018). More recently, GenAI has received increasing attention for its potential application in this context (e.g., Barrot, 2023; Guo & Wang, 2024; Steiss et al., 2024; Yao et al., 2025), demonstrating greater adaptability to individual teachers' instructional needs than earlier tools. With the recent introduction of the "My GPTs" feature in ChatGPT, it is now feasible to develop GenAI-based, customized feedback tools tailored to the specific needs of individual teachers (Lee et al., 2025b).

Fourth, GenAI is expected to assist L2 teachers in reliably scoring a large volume of students' output (e.g., essays) (i.e., automated scoring). Notably, although automated feedback is often featured in academic discussion alongside automated scoring under the umbrella term *automated writing evaluation* in the field (Hockly, 2019), and the two can indeed be implemented concurrently in practice, we distinguish between them in this study, as most existing GenAI-related L2 research has treated automated feedback and scoring as separate issues in their research aims and designs (e.g., Barrot, 2023; Bucol & Sangkawong, 2024; Guo & Wang, 2024; Kim et al., 2025; Shin & Lee, 2024; Steiss et al., 2024; Yao et al., 2025). Recent studies on this issue (Bucol & Sangkawong, 2024; Kim et al., 2025; Shin & Lee, 2024) have shown that the scores produced by GPT-based tools correlate highly with those of human raters and that indices related to rater consistency fall within acceptable ranges. Considering these promising findings, automated scoring could be another object concerning the use of GenAI by L2 teachers.

Finally, L2 teachers may benefit from AI technologies in identifying optimal, individualized learning paths for their students. A recent meta-analysis by Lee and Lee (2024), which synthesized 61 samples ($N = 8,282$) from 17 studies on the use of AI for individualized instruction, found that AI-guided language learning yielded significantly better outcomes than traditional, non-AI-guided approaches ($d = 0.39$), demonstrating its effectiveness in language learning. However, most of the technologies examined in the included studies were not based on GenAI. Consequently, GenAI-guided individualized language learning may yield even greater benefits, although this remains to be empirically validated through future research.

Rules: Policies and Evolving Norms Concerning the Use of GenAI

In the GMAT model, the rules refer to explicit policies and evolving norms concerning the use of GenAI in education. At the institutional level, they may include disclosure rubrics that require users (i.e., teachers and learners) to specify how GenAI is to be used in their work (e.g., whether it is employed for idea generation, content creation or other purposes), institutional policies on academic integrity (e.g., acceptable uses of GenAI for academic writing), and ethical and cultural norms such as copyright and ownership issues of GenAI-generated content (see Hwang et al., 2025b and Cheung & Shi, 2024 for

discussion on this issue in educational contexts). More broadly, these rules may include general ethical considerations regarding GenAI use in education, such as UNESCO's *Recommendation on the ethics of artificial intelligence* (UNESCO, 2021) and other national or institutional principles and guidelines specific to the context in which a teacher operates (Moorhouse et al., 2023).

Although further research is needed on the specific rules governing GenAI-mediated instruction, it seems apparent that L2 teachers' engagement in GenAI-mediated instruction is shaped by these policies and norms in complex ways. Moreover, it should be noted that such rules are not static but are continually negotiated and revised by members of the target community, a component we discuss in the next section.

Community: Classroom and Institutional Contexts, including GenAI-focused Networks

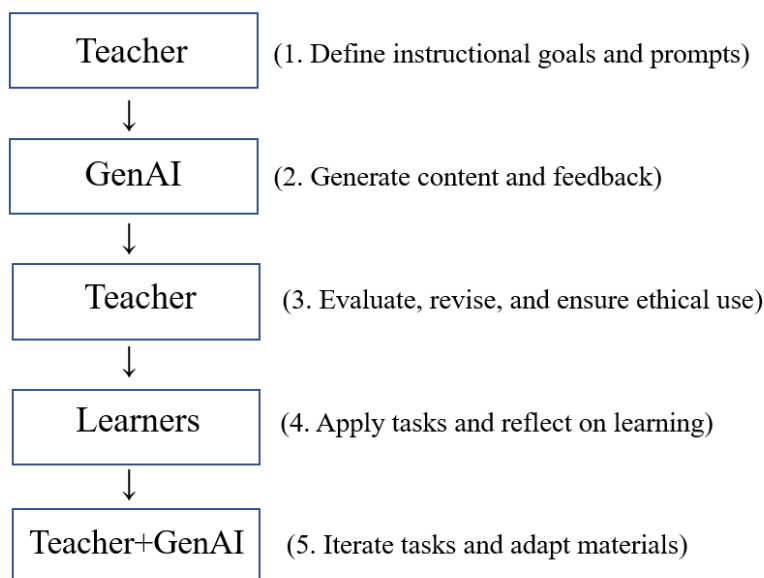
Community, another component of the framework, can range from the broader target language community (e.g., native English speaker community) to a more immediate, local classroom environment and its participants (e.g., students enrolled in the course). In the current model, we define community as encompassing the classroom and institutional contexts in which a teacher operates, as well as online and offline GenAI-focused communities for language educators (Lee & Jeon, 2024). The latter communities have gained increasing importance in the post-pandemic era (e.g., Ito, 2025), offering language teachers opportunities to stay updated on emerging technologies and exchange innovative practices with their peers. According to this model, this component fosters knowledge exchange, prompt-sharing, co-design of tools, and reflection on ethical issues surrounding the use of GenAI (Moorhouse et al., 2023). The community as an expanding collaborative network could influence the object of teachers' activity and mediate teachers' evolving identity and agency in using GenAI (Lee et al., 2025a). Tan et al. (2025) illustrate this expansion in their study of teachers using GenAI as a learning companion, reporting that teachers evolved from individual learners to community leaders who leveraged GenAI insights to facilitate "professional learning teams" for their colleagues (p. 10). This demonstrates how the community component in GMAT serves as a space where AI-mediated agency is distributed and amplified across the professional network.

Division of Labor: Distributed Teacher-GenAI collaboration

The division of labor in the GMAT framework is fundamentally restructured as GenAI partially assumes roles that traditionally belong to the teacher (e.g., generating materials, scoring assessments, or suggesting feedback). In this model, teachers serve as orchestrators and evaluators of GenAI's output and are expected to undertake several responsibilities (i.e., division of labor).

First, once the object is defined, they should draft prompts to instruct GenAI with their prompt literacy. Next, teachers should review the AI-generated output (e.g., scoring, feedback, or instructional materials) and either revise it directly or refine the initial prompts provided to GenAI. For instance, if GenAI's scoring of language proficiency in EFL students' essays is overly harsh, a teacher might remind GenAI that these essays are written by non-native speakers of English (Shin & Lee, 2024). Indeed, careful utilization of AI-generated outputs has been emphasized by educational researchers (e.g., Kanik, 2024; Poláková et al., 2024; Shin & Lee, 2023), as such outputs are not error-free and often require revision by teachers.

Labor is also distributed to GenAI. Yao et al. (2025) proposed that in the context of L2 writing instruction for secondary-level students, a GenAI-based chatbot could "primarily address linguistic issues, evaluate the organization and structure of student writing, and offer writing samples for students' reference," tasks they attributed to GenAI labor (p. 13). This redistribution of labor is supported by Erdawati et al. (2025), whose quasi-experimental study with 250 students demonstrated that delegating mechanical corrections (grammar, spelling) to GenAI allowed teachers to shift their cognitive resources toward more holistic aspects of assessment, such as content quality and logical organization. To visualize these changes, [Figure 3](#) describes the interactions among the teacher, GenAI, and learners within the distributed division of labor in the GMAT model.

Figure 3*Distributed Division of Labor in the GMAT Model*

This figure demonstrates how the division of labor is cyclically distributed within the GMAT system: (1) teachers define instructional goals and prompts, (2) GenAI generates content and feedback, (3) teachers evaluate this output, revise it, and ensure that it aligns with pedagogical and ethical principles, (4) learners apply the GenAI-mediated tasks and reflect on their learning, and (5) teachers and GenAI iterate the aforementioned stages and adapt the tasks and materials as needed.

Overall, the components of the GMAT framework do not operate in isolation. Instead, they form a dynamic and co-mediated structure that shapes teaching preparation and practice. Through interactions among the subject, object, mediating artifacts, rules, community, and division of labor, GenAI and teachers jointly redefine instructional goals, responsibilities, and pedagogical decision-making. This synergy suggests that GenAI-mediated L2 teaching should be examined as an interconnected system in which teacher agency, identity, and instructional practice are continuously (re)constructed. Given this, the next section not only contrasts how traditional AT applications differ from the GMAT model but also describes an illustrated example (hypothetical) that traces how a teacher navigates each of the six components of GMAT in a GenAI-mediated lesson design.

Traditional AT and GMAT: Model Comparison with a Case Example of GMAT

The six components in the GMAT framework reviewed in the previous sections form a dynamic and interconnected system in which GenAI is both a tool and a catalyst of dynamic change in education. By examining how GenAI mediates and transforms each element in this framework, the GMAT model offers a practical lens for theorizing L2 teacher development and instructional changes in GenAI-mediated learning environments. While previous AT studies on technology integration in L2 teaching have mainly focused on how specific technologies mediate the components of the activity system (e.g., tools facilitating interaction, or institutional rules guiding technology use), the GMAT model extends this inquiry by exploring how GenAI actively reshapes the characteristics and interrelations of each component.

This section therefore aims to describe how GenAI changes the traditional notion of technology as a mediating tool within AT and to highlight key differences between GMAT and previous AT frameworks with digital technologies.

Table 1*Traditional AT vs. GMAT*

AT Component	Traditional AT (Digital Tech)	GMAT (GenAI Contexts)
Subject	Human teacher as primary agent	Teacher as multi-positional agents who critically engage with GenAI to create, revise, and personalize instructional content
Object	Predefined instructional goals	Emergent, iteratively refined goals shaped by GenAI affordances/limits
Mediating Artifacts	Fixed tools that facilitate L2 tasks	Artifacts (i.e., GenAI) continuously expand their affordances through ongoing model refinements
Rules	(more or less) Stable norms/policies for tech use	Policies and norms concerning the use of GenAI that are continually negotiated and revised in the target sociocultural context
Community	Local/classroom or school networks	A multilayered sociocultural network encompassing classroom participants (i.e., teachers and students), institutional, and online GenAI-focused communities
Division of Labor	Teacher designs/delivers; tools support	Distributed labor among teacher, GenAI, and learners

As shown in [Table 1](#), the *subject* shifts from the traditional role of teachers as primary agents to that of multi-positional agents who engage with GenAI to create, revise, and personalize instructional content. The *object* evolves from the general goal of effective instruction to emergent, iteratively refined goals that depend on GenAI's affordances and limitations. The *mediating artifacts*, once understood as static instructional tools, are redefined as artifacts (i.e., GenAI) that continuously expand their affordances through ongoing model refinements. The *rules* have also expanded to encompass evolving principles and norms that govern the use of GenAI and delineate the boundaries of its acceptable applications. The *community* is reconceptualized as a multilayered sociocultural network encompassing classroom participants (i.e., teachers and students), institutional stakeholders, and online GenAI-focused communities that collaboratively shape classroom practices. Finally, the *division of labor* is (re)distributed through collaboration with GenAI and by eliciting reflection from learners, while teachers still assume the most prominent role as pedagogical orchestrators and coordinators within the overall system.

To showcase how these transformations work in real language classrooms, this study illustrates one of the authors' experiences as an EFL professor in a tertiary education context. First, his instructional design was initially set by traditional AT settings: as the subject, he was primarily a writing instructor, and the lesson objective was straightforward. In this class, students would write an argumentative essay, warning against the risk of uncritical use of GenAI output and its hallucinations. Here, the mediating artifacts were primarily a single text-based large language model (LLM) (e.g., ChatGPT, Claude, Gemini, etc.) for brainstorming claims, revising sentences, or fixing grammatical errors. Meanwhile, the work rules followed existing institutional guidelines on AI-assisted writing. His institutional community was mainly composed of his students and colleagues in the English department, and the division of labor also remained traditional (students wrote the texts while he provided feedback). However, during his teaching preparation, he experimented with a GenAI image generator to create simple visual prompts depicting scenarios of GenAI misuse. He was amazed by the potential of creating images with GenAI for L2

learning purposes, moving beyond what he intended as supplementary material. He realized that integrating detailed prompts into the writing process was key to producing high-quality AI-generated images.

With the iterative revision process of his prompts (his stories), GenAI was able to create consistent characters, the same settings, and metaphors describing GenAI's responsibility in a visually persuasive manner. These multimodal affordances offered a multitude of options that fundamentally changed the instructional focus. Instead of focusing on constructing a typical argumentative essay, for example, the students' writing was reoriented to digital multimodal composition and webtoons that visually and textually advocated for the responsible use of GenAI. This shift in instructional focus reshaped his pedagogical practices and his role as the subject within the activity system. He transitioned from being a writing instructor to assuming the role of a multimodal designer, curator, and co-creator with GenAI. Writing and revising prompts to select and modify images as a form of L2 writing practice became central aspects of his pedagogical identity, and he asked students to create a 6-panel webtoon based on their own storytelling and webtoon dialogue and captions. [Figure 4](#) shows one of the actual examples created by a student in the course: a comic describing the risks of uncritical reliance on GenAI. The comic illustrates a courtroom scene in which a user accuses ChatGPT of causing him to lose a client. In his defense, the GenAI avatar states that while it assists with language generation, the meaning and the responsibility are the user's. The last frame ("AI can speak for you, but it can't think for you") captures the exact position the researcher hoped his students would address in an argumentative essay. However, the comic offered greater rhetorical flexibility, emotional engagement, and narrative complexity than a simple writing assignment.

Figure 4

Actual Example of a Student Webtoon



The change the researcher experienced in this example illustrates how GenAI (re)structures the focus of instruction, L2 teachers' own sense of teaching identity, and teaching practices in the classroom. The mediating artifacts changed from one text-based LLM to many multimodal GenAI resources. Additionally, the rules governing the writing activity also evolved from only focusing on syntactical elements of writing to requiring new agreements on transparency, ownership, ethical representation, and collaboration with GenAI. Similarly, his community broadened. He consulted colleagues in digital media, exchanged prompts with online GenAI teacher groups, and incorporated student feedback about multimodal storytelling. Most importantly, the division of labor changed: GenAI supported students when they selected, adapted, narrated, negotiated, and integrated meaning into the multimodal content, which was traditionally defined by one word: write. As a teacher, he thus emphasized the complexity of guiding arguments, multimodal coherence and integration, and ethical use of GenAI.

Pedagogical Implications

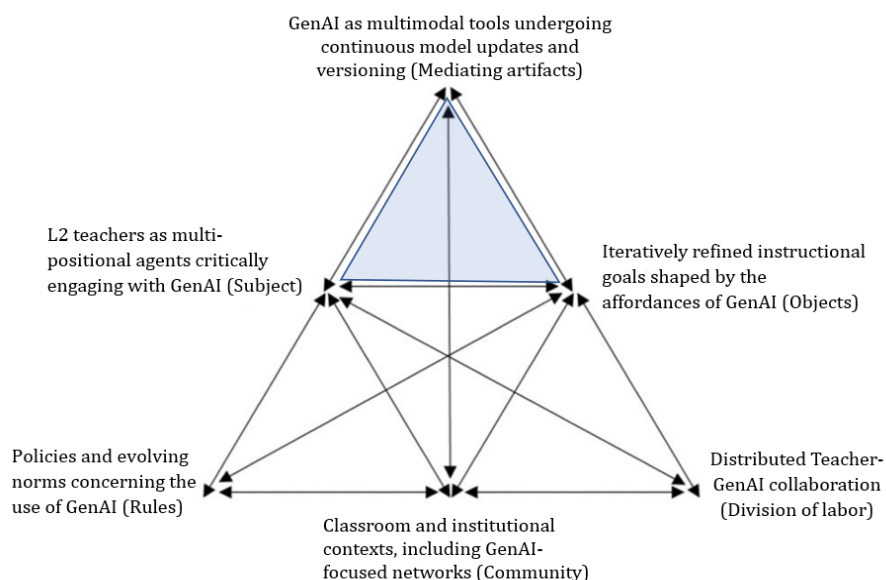
The GMAT model offers a theoretical and pedagogical framework for (re)constructing the roles of L2 teachers and their teaching practices in the era of GenAI-supported language teaching. Based on this model, we suggest four pedagogical implications to guide teacher education, professional development, and institutional considerations when using GenAI in education.

Co-construction of Instructional Goals through Human–GenAI Mediation

The integration of GenAI tools (mediating artifacts) into L2 teaching practice fundamentally changes how teachers (subjects) conceptualize and pursue instructional goals (objects). In the GMAT model, rather than simply implementing pre-determined objectives, teachers can frequently refine their teaching goals in response to GenAI's output, adaptability, and affordances. For example, a teacher might initially aim to teach argumentative essay writing, but after experimenting with a GenAI chatbot, they may redefine the objective towards dialogic thinking or peer-like GenAI interaction (Steiss et al., 2024; Yao et al., 2025). In this way, instructional objects emerge and are shaped by the evolving dynamics between human teachers and GenAI (see Figure 5).

Figure 5

Co-construction of Instructional Goals through Human–GenAI Mediation



In contrast to previous educational technologies that functioned as relatively static tools, GenAI mediates the instructional design process as a thinking partner (Moorhouse, 2024). For instance, when a teacher designs activities to enhance reading comprehension, they can employ GenAI to generate differentiated questions, adapt passages for varying proficiency levels, or even simulate literary character interviews (Kohnke et al., 2023). Such interactions often lead to new insights and iterative refinements of instructional goals (Choi et al., 2024).

As GenAI reshapes teachers' cognitive and pedagogical processes, it becomes essential for teacher education programs to respond accordingly. Specifically, such programs should not only emphasize the practical use of GenAI tools but also foster the development of evaluation strategies that enable teachers to monitor the quality and potential biases (e.g., cultural discrimination) of GenAI-generated outputs, as well as to assess the pedagogical effectiveness of GenAI-mediated tasks through learners' feedback, performance data, and teachers' own reflections.

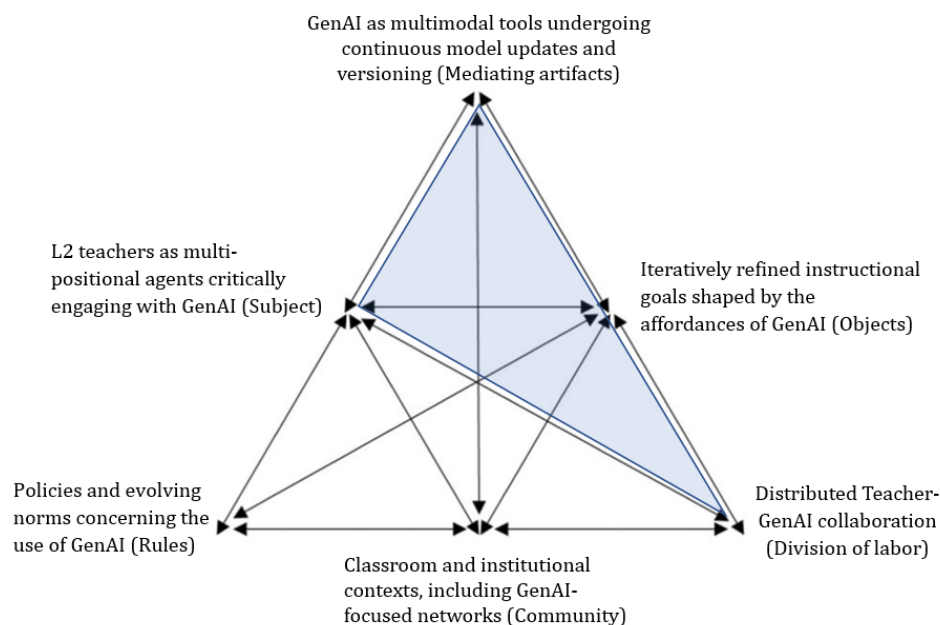
Taken together, teachers' cognitive processes are extended through GenAI, and the object of instruction becomes mutually mediated rather than fixed. This reconceptualized relationship within the GMAT model provides new insights into how educators can learn to think *with* and *through* technology.

Enhancing Prompt Literacy and Human-GenAI Co-creation

One of the pedagogical implications of the GMAT model is the need to cultivate L2 teachers' prompt literacy and their abilities for human-GenAI co-creation (Hwang et al., 2023; Hwang et al., 2025b; Lee et al., 2025a). To this end, enhancing L2 teachers' knowledge of GenAI (what GenAI can do, and what they can do with GenAI for their teaching) and improving prompt literacy are crucial, which shape how L2 tasks are performed, who performs them, and how authority and labor are newly distributed in the interconnected activity system (Choi et al., 2024) (see Figure 6).

Figure 6

Enhancing Prompt Literacy and Human-AI Co-creation



Specifically, in GenAI-mediated instructional settings, teachers are no longer passive users of digital tools but active designers who co-create with mediating artifacts (i.e., GenAI) (Kohnke et al., 2023; Moorhouse et al., 2023). This shift requires teachers to understand the strengths and limitations of GenAI tools in

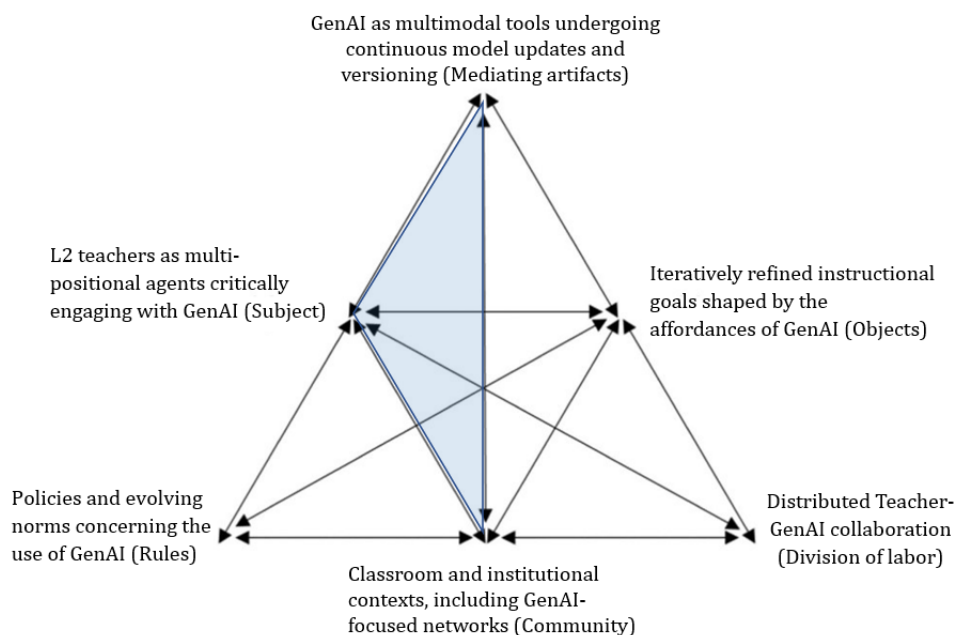
various instructional contexts, acquire the ability to critically evaluate GenAI-generated output, and, when necessary, iteratively revise prompts or content (Ahn et al., 2024). Consequently, cognitive and creative responsibilities are redistributed between teachers and GenAI, with teachers orchestrating GenAI's contributions while maintaining pedagogical control and agency (Lee & Jeon, 2024). To support this shift, professional development initiatives should include hands-on workshops in which teachers engage in authentic GenAI tasks such as creating differentiated lesson materials or customizing GenAI-based feedback templates (Lee et al., 2025a).

Building Gen-AI Communities for Pedagogical Co-evolution

In the GMAT model, the dynamic interaction between teachers (subject), GenAI (mediating artifacts), and educational communities, as illustrated in Figure 7, offers critical insights into how L2 teachers build agency and pedagogical expertise in the whole activity system (Lee & Jeon, 2024). Unlike conventional models in which technological tool use is largely individual and procedural, GenAI transforms this to a socially mediated process, in which teachers' engagement with technology is deeply intertwined with the norms, expectations, and practices of the communities to which they belong (Chiu, 2024).

Figure 7

Building Gen-AI Communities for Pedagogical Co-evolution



Owing to the fast-paced development of GenAI technologies, individual teachers may struggle to stay updated on creative and effective applications of these tools (Chiu, 2024; Lee et al., 2025b). In this context, online and offline teacher networks and/or institutional working groups play crucial roles in deciding how GenAI should be used, by whom, and to what extent (Chiu, 2024). In some cases, communities may collaboratively define best practices for prompt design (see Lin, 2023, for an example of sharing a prompt to generate a GPT-based concordancer), evaluation of GenAI outputs, or strategies for integrating GenAI into curricula. However, tensions may arise, especially when different stakeholders hold different perspectives or opinions on the role and reliability/validity of GenAI tools (Kamalov et al., 2023). These discussions, whether formal or informal, directly influence how GenAI is positioned in the community within the instructional ecosystem (Chiu, 2024). This form of professional collaboration and networking reinforces the teacher's role as a subject and situates GenAI as a shared mediating artifact

shaped by social dialogue (Lee & Jeon, 2024; Moorhouse et al., 2023).

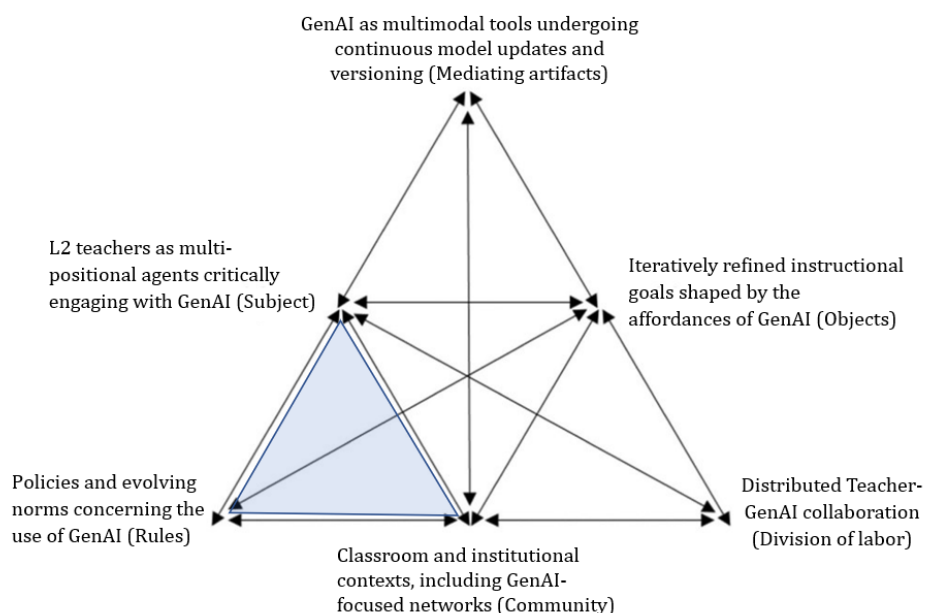
As communities frequently exchange GenAI tools and share case studies, teachers can learn how GenAI is perceived and employed in the activity system as distributed sociotechnical agency, defined as a form of agency in which purposeful action emerges not solely from individuals but through the interplay among humans, technological artifacts, and social contexts (Godwin-Jones, 2024). This view highlights that GenAI-mediated teaching is embedded in sociotechnical systems where innovation and professional practice are co-constructed in a collective manner. Therefore, pedagogical implications should highlight not only individual mastery of GenAI tools but also networked learning, in which teachers engage in collaborative exploration, joint problem-solving, and reflective practice (Chiu, 2024). By recognizing that teacher agency is co-constructed through technological artifacts and the communities of practice to which they belong, these components of the GMAT model foster an environment in which pedagogical innovations with GenAI are not isolated efforts but are part of an evolving, socially situated professional practice (Lee & Jeon, 2024).

Negotiating Ethics, Rules, and Ownership When Using GenAI

In the GMAT model, teachers' decisions on how to incorporate GenAI tools into their teaching practice are shaped by the interaction between their personal agency (subject), institutional norms and ethical frameworks (rules), and the expectations and culture of the educational community (community) (Choi et al., 2024; Lee et al., 2025a; Moorhouse, 2024; Moorhouse et al., 2023), as illustrated in Figure 8. The GMAT model highlights that pedagogical decisions are not made solely based on what is technically possible, but through negotiation among what is pedagogically desirable, ethically acceptable, and communally supported (Choi et al., 2024).

Figure 8

Negotiating Ethics, Rules, and Ownership When Using GenAI



While teachers bring their own beliefs, goals, and professional identities to the classroom, they should interpret and respond to existing rules when integrating GenAI into their teaching practice. These rules include institutional policies regarding GenAI use, national ethical frameworks, and class-level expectations concerning academic integrity, transparency, and learner autonomy (Chiu, 2024; Moorhouse

et al., 2023). For example, a teacher may wish to employ GenAI for formative assessment (Lee & Jeon, 2024), but institutional rules may restrict the use of automated scoring systems due to concerns about bias or reliability. Concerns about safety (i.e., how learner data are stored and used in GenAI (Crosthwaite & Baisa, 2023) and hallucinations (Shen et al., 2023) seem to be some of the reasons why educational institutions do not fully support the integration of GenAI into their systems.

Beyond formal rules and ethical guidelines, it should be noted that the integration of GenAI within educational communities can also generate tensions that reflect broader social and linguistic dynamics. Variations in institutional rules, technological infrastructure, and community support may lead to unequal opportunities for both teachers and learners in adopting and using GenAI tools. Moreover, because most GenAI models are predominantly trained in English and its standardized varieties, they tend to reproduce linguistic biases, thereby privileging some language communities while marginalizing users whose first language is not English (e.g., Gallegos et al., 2024; Lee et al., 2025b; Pretorius et al., 2025). These tensions highlight the need for ongoing negotiation within the community to reinterpret and adapt existing rules, ensuring that GenAI-mediated pedagogical practices promote equity and shared responsibility across diverse educational contexts.

Therefore, it is essential that institutions (community) and teachers (subject) collaboratively develop flexible yet robust guidelines (rules) for using GenAI tools (Moorhouse et al., 2023). Such policies should be context-sensitive, reflecting the realities of specific teaching environments, and should be created through participatory processes that involve administrators, teachers, and learners (Chiu, 2024; Lee & Jeon, 2024).

Concluding Remarks

This study proposes the GMAT model for L2 teachers, grounded in activity theory. Given that much of the existing research on GenAI-mediated L2 instruction lacks a coherent theoretical foundation, the GMAT model offers a strong analytical lens to better understand L2 teachers' engagement in GenAI-mediated pedagogical practices. By providing a structured framework, GMAT has the potential to facilitate the development of comprehensive and evidence-informed pedagogical implications. While the GMAT model presents a promising theoretical contribution, its practical applicability and validity remain to be empirically evaluated. We therefore encourage future research to adopt or adapt this model in diverse instructional contexts.

In conclusion, the GMAT model is more than a theoretical lens. It is a prism through which we can reimagine what it means to teach, learn, and collaborate in an era where humans and GenAI coexist. As GenAI continues to evolve, it will transform instructional tools and reshape the broader pedagogical ecosystem. In this context, L2 teachers should act as proactive instructional innovators who engage with GenAI to maximize their pedagogical effectiveness. The GMAT model was developed as part of this transformative call.

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