



## ORIGINAL PAPER

# Natural Language Processing as an Integrated Model of AI-Mediated Pedagogy

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### Abstract:

The rapid advancement of Artificial Intelligence has intensified interest in the pedagogical applications of Natural Language Processing (NLP) for English Language Teaching (ELT). While NLP-based systems have demonstrated effectiveness in areas such as automated feedback, adaptive tutoring and conversational practice, their integration into educational contexts remains constrained by limitations in emotional intelligence, pragmatic competence and multimodal communication. This article examines how NLP can be productively integrated into AI-driven ELT systems by situating technological developments within a broader theoretical and pedagogical framework. By integrating research from NLP, computer-assisted language learning, affective computing and second language acquisition, the article proposes a framework in which NLP operates as a linguistically precise yet affectively delimited support structure for communicative development. Rather than pursuing full emotional simulation, the article argues for a principled integration of linguistic analysis, discourse modeling and limited affective responsiveness, positioning AI as a complementary agent within human-centered language education.

**Keywords:** *pragmatic competence, automated analysis, communicative realism.*

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## Introduction

In the domain of language learning, the incorporation of Artificial Intelligence into educational practice, at least in ELT contexts, has shifted from experimental novelty to structural presence. Language education has proven especially receptive to AI-mediated innovation due to its reliance on symbolic systems and patterned input. Among the enabling technologies behind this shift, Natural Language Processing (NLP) occupies a central position, as it provides machines with the capacity to analyze, generate and respond to human language in increasingly sophisticated ways. In English Language Teaching (ELT), NLP-driven systems are now widely used in grammar correction, automated writing evaluation, dialogue-based practice, pronunciation feedback and personalized learning pathways. These systems promise consistency and individualized attention, which are qualities that are difficult to achieve in traditional classroom settings alone. At the same time, however, language learning is not reducible to formal linguistic competence. Communication involves pragmatic sensitivity, emotional adjustment, sociocultural norms and interpretive judgment, all of which exceed the current capabilities of NLP systems.

Emotional Intelligence, defined as the ability to recognize, interpret and respond appropriately to affective states, plays a crucial role in communication and language acquisition. Learners' motivation and willingness to communicate are deeply shaped by emotional experience. This raises a central question for AI-mediated pedagogy: how can NLP, a technology optimized for linguistic pattern recognition, meaningfully support emotionally and socially situated language learning without overstating its interpretive capacities? This article tackles this question by critically examining research on NLP in language education and proposing an integrative framework that aligns computational affordances with pedagogical principles. We consider it would be useful, not only in Romanian ELT classes, but in general, as it would trigger efficiency and communicative authenticity among students. Rather than treating Emotional Intelligence as a feature to be fully replicated by AI, the article argues for a constrained and pedagogically grounded use of affective modeling embedded within robust linguistic and discourse-level processing.

## NLP and Linguistic Competence in English Language Teaching

NLP provides the computational foundation for AI-mediated ELT by enabling automated analysis of learner language across multiple levels of structure, including morphology, syntax, lexis, cohesion and discourse organization. Early applications of NLP in language learning relied heavily on rule-based grammars and predefined error categories. While such systems were effective for controlled exercises, they were limited in their ability to handle learner variability, non-standard input and communicative intent. The transition towards machine learning and neural language models has significantly expanded NLP's pedagogical potential. Transformer-based architectures can now model contextual dependencies, idiomatic usage and stylistic variation with increasing reliability. In ELT contexts, these advances allow AI systems to provide feedback that goes beyond error detection to include explanations of usage, register appropriateness and alternative formulations.

Empirical studies indicate that NLP-driven feedback can improve grammatical accuracy, lexical diversity and writing fluency, particularly when feedback is immediate, specific and tailored to learner proficiency (Heift & Schulze, 2015; Li, 2021). From a

second language acquisition perspective, we interpret such feedback as a support for the process of *noticing*, enabling learners to attend to form–meaning relationships without interrupting communicative engagement. In this respect, NLP contributes directly to linguistic competence while preserving learner autonomy and supporting self-regulated learning.

### **Discourse, Interaction and Communicative Competence**

Communicative competence in a second language extends beyond grammatical accuracy to include the ability to participate meaningfully in discourse and social interaction. Following Hymes' foundational distinction between linguistic competence and communicative competence, successful language use requires sensitivity to context, interlocutor roles, discourse conventions and pragmatic intent (Hymes, 1992). From this perspective, the pedagogical value of NLP in English Language Teaching depends not only on sentence-level processing, but also on its capacity to model discourse-level phenomena.

Recent developments in NLP have enabled AI systems to process extended stretches of text and dialogue by maintaining contextual representations across multiple turns. Dialogue systems equipped with discourse tracking mechanisms can recognize topic continuity, reference resolution, adjacency pairs and conversational sequencing. In ELT settings, this allows AI tutors to simulate structured interactions such as interviews or academic discussions, offering learners opportunities to rehearse communicative routines that are otherwise difficult to practice individually.

Research on conversational intelligent tutoring systems suggests that such interactional structures support the systematization of language knowledge. Learners interacting with AI systems tend to produce longer utterances, engage in negotiation of meaning and demonstrate increased fluency over time (Graesser et al., 2014: 612). Importantly, these gains are linked not to the illusion of human-like interaction, but to the predictability and pedagogical focus of AI-mediated dialogue, which reduces cognitive load and performance anxiety. Nevertheless, the discourse competence supported by NLP remains fundamentally constrained. AI systems generate responses based on statistical regularities rather than interpretive understanding, which limits their ability to manage indirect speech acts. As a result, NLP-driven interaction should be conceptualized as *guided communicative rehearsal* rather than authentic social engagement. When integrated transparently into ELT curricula, such rehearsal can play a crucial role in preparing learners for real-world interaction without misrepresenting the nature of AI.

### **Emotional Intelligence and Constrained Affective Responsiveness**

Emotional Intelligence is recognized as a key factor in successful language learning. It influences motivation and willingness to communicate. Language classrooms are affectively charged environments in which anxiety and confidence shape learners' behavior as much as cognitive aptitude. The integration of NLP into AI-mediated ELT therefore raises important questions about the role of emotion in human–machine interaction. Current NLP systems are limited in their ability to interpret emotional meaning beyond surface-level textual indicators. Sentiment analysis and emotion classification models typically rely on lexical cues and syntactic patterns, enabling them to detect broad affective categories such as positivity, negativity or basic emotions. While these tools have achieved impressive accuracy in constrained domains, they struggle with

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ambiguity, irony or culturally specific emotional expression, all of which are features that are common in authentic language use.

In educational contexts, specifically in the domain of ELT, this limitation has led researchers to advocate for a model of *constrained affective responsiveness* rather than full Emotional Intelligence. Under this model, AI systems do not attempt to simulate empathy or emotional understanding in a human sense. Instead, they monitor affective signals that are directly relevant to learning processes, such as expressions of confusion, frustration or disengagement. These signals may be inferred from linguistic behaviors including repeated errors, hesitation markers, negative self-assessment or abrupt task abandonment. Empirical research in Affective Computing indicates that instructional interventions triggered by such signals, for instance offering hints, slowing task progression or providing neutral encouragement, can improve learning outcomes without requiring deep emotional interpretation (D’Mello & Graesser, 2012: 145). Importantly, these responses are framed as pedagogical strategies rather than emotional dialogue, preserving transparency and avoiding anthropomorphic misrepresentation. This constrained approach aligns with ethical considerations in AI design, minimizing the risk of emotional manipulation while still acknowledging the affective dimensions of learning. In ELT, however, it allows NLP systems to support learner engagement and persistence without overstepping their interpretive capabilities.

### Multimodal Integration and Communicative Realism

Language use is inherently multimodal, especially in spoken interaction, where meaning is distributed across verbal and nonverbal channels. Pronunciation, intonation, rhythm, gesture and facial expression are components of communication that contribute to communicative effectiveness and pragmatic appropriateness. Consequently, NLP-based systems achieve greater pedagogical relevance when integrated with complementary modalities such as speech processing and prosodic analysis. Automatic speech recognition (ASR) technologies, when combined with NLP, enable AI systems to provide feedback on spoken production, including segmental accuracy, stress placement and intonation patterns. Research in pronunciation pedagogy demonstrates that such feedback can significantly improve intelligibility, particularly when learners receive visual or auditory representations of prosodic features (Derwing & Munro, 2015). Moreover, discourse-level prosody, such as turn-taking cues and emphasis, can be modeled to support conversational competence. Multimodal integration also enhances communicative realism by approximating the temporal and interactive dynamics of real-world communication. Dialogue systems that incorporate timing, hesitation and overlap simulate conversational rhythm more effectively than text-only interfaces. However, the inclusion of visual modalities such as facial recognition introduces ethical challenges related to privacy and consent. As a result, many educational AI systems prioritize speech-based multimodality, which offers pedagogical benefits with fewer ethical risks.

From a pedagogical standpoint, we consider that multimodal NLP systems should be designed to foreground intelligibility and communicative effectiveness rather than native-like performance. This orientation aligns with contemporary ELT goals, emphasizing successful communication over prescriptive norms and allowing AI to function as a supportive training environment rather than an evaluative authority.

### **Methodology**

In this article we are employing a qualitative integrative methodology designed to synthesize insights from multiple research traditions relevant to AI-mediated English Language Teaching. Rather than presenting new experimental data, the article adopts a conceptual-analytical approach grounded in Applied Linguistics, Educational Technology, Natural Language Processing and Affective Computing. The literature which we have reviewed for this article was selected based on three criteria: relevance to NLP-based language instruction, empirical or theoretical contribution to understanding learning outcomes and applicability to communicative competence or affective dimensions of learning. Sources include peer-reviewed journal articles, foundational monographs and widely cited conference proceedings. Emphasis was placed on studies that examine learner interaction with AI systems rather than purely technical performance metrics.

The methodological stance reflects the interdisciplinary nature of the research problem. Language learning is simultaneously a cognitive, social and emotional process. However, no single methodological framework is sufficient to capture its complexity. Thus, by integrating findings across disciplines, the article constructs a theoretically coherent model of NLP integration that remains pedagogically grounded. This approach allows for critical evaluation of technological claims, distinguishing between demonstrable instructional benefits and speculative aspirations. Methodologically, the article positions itself between empirical synthesis and theoretical modeling, aiming to inform both future research design and practical implementation in ELT contexts.

### **Future Research Directions**

Recent research increasingly emphasizes the need for longitudinal and ecologically valid studies of AI-mediated language learning. While short-term experimental designs dominate the literature, researchers such as Burstein et al. (2014) and Li (2022) argue that sustained exposure is necessary to assess whether AI-supported interaction leads to durable gains in communicative competence and pragmatic transfer. Longitudinal classroom-based studies would allow researchers to trace how learners' discourse strategies evolve over time and how AI-mediated practice interacts with teacher-led instruction.

Pragmatic competence remains a particularly underexplored domain. Studies by Taguchi (2015) and Kasper and Rose (2002) demonstrate that pragmatic development is highly sensitive to instructional design and contextualized input. Integrating these insights with NLP research suggests the need for hybrid instructional architectures that combine data-driven language models with explicit pragmatic frameworks. Preliminary work by Cohen and Ishihara (2013) on technology-enhanced pragmatics instruction offers a foundation for exploring how AI systems might support speech acts, politeness strategies and sociocultural norms more effectively. Affective dimensions of AI-mediated learning also warrant deeper investigation. D'Mello and Graesser (2012) and Calvo and D'Mello (2010) have shown that affect-aware systems can support engagement, but they caution against overinterpreting emotional signals. Recent ethical analyses (Zawacki-Richter et al., 2019; Holmes et al., 2022) underscore the importance of transparency and learner agency when deploying affect-sensitive technologies in educational settings. Qualitative studies examining learner perceptions of emotional responsiveness in AI tutors would therefore be a valuable complement to performance-based metrics.

Finally, concerns about linguistic bias and representational inequity are increasingly prominent in both NLP and applied linguistics. Research by Blodgett et al.

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(2020) and Baker-Bell (2020) highlights how language technologies may inadvertently privilege standard or dominant varieties of English. Future research should examine whether AI-mediated ELT environments reinforce or challenge such hierarchies, particularly in multilingual classrooms. Incorporating English as a Lingua Franca perspective (Jenkins, 2015: 49) into NLP system design represents a critical frontier for both research and practice.

### Final Considerations

Based on the research reviewed here, it is our opinion that the pedagogical implications of NLP integration must be evaluated within established theories of language learning and instruction. Communicative Language Teaching and task-based frameworks emphasize meaningful interaction, learner autonomy and contextualized use of language (Ellis, 2003; Long, 2015). NLP-based systems align with these principles insofar as they provide structured opportunities for interaction and feedback, but their effectiveness depends on thoughtful curricular integration rather than technological sophistication alone.

Concerns about anthropomorphism and over-attribution of intelligence to AI systems have been widely discussed in the literature on human–computer interaction. Nass and Moon (2000: 81-103) demonstrate that users tend to apply social expectations to interactive technologies, a tendency that becomes increasingly important in educational contexts. Framing AI output as pedagogical material rather than conversational agency is therefore essential to maintaining epistemic clarity and avoiding misleading representations of machine understanding. The central role of the teacher in AI-enhanced classrooms is strongly supported by research on blended and technology-mediated learning. Studies by Bax (2011: 12) and Kessler (2018: 205) emphasize that technological tools are most effective when teachers actively mediate their use, contextualize feedback and align digital interaction with learning objectives. In this sense, NLP systems function as amplifiers of pedagogical intention rather than autonomous instructors.

From a broader educational perspective, the integration of NLP into ELT reflects a shift toward what Selwyn (2019) describes as *critical digital pedagogy*, in which technological innovation is evaluated in terms of its social, ethical and educational consequences. By situating NLP within this critical framework, teachers and researchers can resist deterministic narratives and focus instead on how AI can support reflective, inclusive and human-centered language education.

### All things considered...

Natural Language Processing offers powerful tools for enhancing English Language Teaching, but its educational value depends on principled integration rather than technological ambition. NLP excels at linguistic analysis, adaptive feedback and dialogic simulation, producing demonstrable learning benefits. Its limitations in emotional and pragmatic understanding are real but manageable through constrained affective modeling and multimodal support. By positioning NLP as a supportive structure for communicative development rather than a surrogate for human intelligence, AI-mediated ELT systems can complement human teaching while respecting the complexity of language as both a cognitive and emotional practice.

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