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Challenges of AI-Empowered Foreign Language Teaching and Human–AI Co-Teaching Pathways from the Perspective of Embodied Cognition

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Abstract: ***The integration of artificial intelligence (AI) is profoundly reshaping foreign language teaching. While offering instant feedback and personalized resources, it also creates tensions between "disembodied" technological rationality and the "embodied" goals of education. From the perspective of embodied cognition, this study examines key dilemmas in AI-empowered teaching, including the marginalization of bodily experience, AI's limitations in emotional understanding and cultural aesthetics, and the crisis of subjectivity caused by imbalanced human–machine relations. This study argues that language acquisition is fundamentally an embodied process, emerging from the interaction among the cognitive subject, the body, space, and the environment. It therefore proposes a human–AI co-teaching model, in which collaborative knowledge construction enables functional complementarity, role reconfiguration, and shared responsibility. By leveraging AI while preserving teachers' central role in contextual design and emotional guidance, this model seeks to restore the embodied nature of language teaching grounded in social interaction and practical use.***

Keywords: Generative Artificial Intelligence (AI), Foreign Language Teaching, Embodied Cognition, Human-AI Co-teaching.

1. Introduction

With the rapid development of generative artificial intelligence (GAI), foreign language teaching is undergoing a profound transformation from digitalization to intelligentization. Leveraging its powerful data-processing capabilities, GAI has demonstrated clear advantages in areas such as listening training, speaking assessment, and the design of personalized learning pathways, significantly improving instructional efficiency while lowering learners' affective filters. However, the increasing reliance of instructional practices on automated assessment and data-driven adaptive systems has given rise to inherent tensions. AI-driven instruction often follows a disembodied technological rationality, reducing complex pedagogy to controllable data structures. In contrast, foreign language learning is fundamentally embodied, grounded in bodily experience, contextual engagement, and generation of meaning through interaction. This tension has led to emerging crises, including the alienation of learners and the shrinking space for teacher–student interaction.

In response, this study adopts embodied cognition as a theoretical framework. By highlighting the roles of bodily experience, spatial schemas, and emotional engagement in second language acquisition, it proposes a new model of human–AI co-teaching. This approach emphasizes collaborative knowledge construction and the reconfiguration of pedagogical roles, aiming to restore language learning to its basis in social interaction and embodied practice.

2. Literature Review

Embodied cognition emphasizes that cognition emerges from the dynamic coupling of the body, environment, and action, and is grounded in the phenomenological tradition. Maurice Merleau-Ponty (2002), in *Phenomenology of Perception*, states that "My body appears to me as an attitude directed towards a certain existing or possible task" (p.114), highlighting the action-oriented nature of the body. Martin Heidegger (1962) argues that the most fundamental mode of human existence is not detached rational contemplation, but rather "being-in-the-world", which establishes the ontological inseparability of the subject and its situational context.

In cognitive science, Maturana and Varela (1998) argue that "All doing is knowing, and all knowing is doing" (p.26), underscoring the unity of cognition and action. Varela et al. (1991), in *The Embodied Mind*, contend that cognition is not based on symbolic computation but "consists in the enactment or bringing forth of a world by a viable history of structural coupling" (p.205). Gibson's (1950, 1966) ecological psychology posits that organisms can directly "pick up" information through interaction with the environment, while Barsalou (2008) maintains that cognition "is grounded in both perception and action", jointly challenging computationalist models.

The "extended mind" perspective further rejects the assumption that cognition is confined to the brain. Clark and Chalmers (1998), through the "parity principle," define the scope of cognitive systems: "If a part of the world functions as a process which we would recognize as part of the cognitive process, then that part of the world is… part of the cognitive process". Rowlands (2009) similarly contends that internal cognitive processes often rely on external environmental supports, thereby reinforcing the view that cognition extends beyond the individual mind.

As embodied cognition theory has developed, scholars have increasingly applied it to educational research. Shapiro and Stolz (2019) criticize the tendency of traditional cognitive science to "investigate minds without regard for their bodily implementation" (p.24), arguing instead that "learning is contingent upon the cognitive activity that is triggered by the environment" (p.29). Leitan and Chaffey (2014) note that the body has traditionally been viewed as "serving the mind," whereas embodied cognition reconceptualizes it as a "constituent of the mind" (p.3). Fugate et al. (2019) further

propose the "Indexical Hypothesis", suggesting that language comprehension involves "indexing words to perceptual symbols… to create a simulation of the situation" (p.279).

Empirical studies further demonstrate the role of bodily action in cognitive construction. Kiefer et al. (2015) find that handwriting provides "richer encoding" than typing, while Ionescu and Vasc (2014) argue that sensorimotor experiences create "stronger sensory-motor memory traces that facilitate learning". At the neural level, the mirror neuron system proposed by Rizzolatti and Craighero (2004), together with Borghi's (2010) claim that unity "comes from action, and not from sensation" (p.768), provides neuroscientific support for the embodied basis of cognition. In second language acquisition, Atkinson (2010) argues that "learning is more discovering how to align with the world than extracting knowledge from it" (p.610), and further emphasizes that "one crucial way learning is guided is by externalizing its object while focusing the learner's attention on it" (p. 611), echoing Vygotsky's (1978) view of language as a social tool.

Within AI-empowered education, human–AI collaboration has become a critical focus of research and practice. Michael (2025) suggests that "AI-supported co-teaching models can partially mitigate teacher shortage", with AI delivering foundational knowledge while teachers provide "mentorship and contextual guidance". However, Li et al. (2026) warn that such applications may lead to the alienation of subjectivity and the compression of interactional space. Addressing issues such as the overshadowing of value rationality, Shen and Wang (2025) advocate for a "cognitive symbiosis" between humans and AI to shift pedagogy from knowledge transmission to knowledge creation.

Overall, existing studies have examined embodied cognition across philosophical foundations, cognitive mechanisms, and educational practices, and have gradually extended it into AI-supported learning contexts. However, current research remains largely focused on technological efficiency and pedagogical innovation, lacking a systematic account of human–AI collaborative learning from an embodied perspective. It is therefore necessary to re-examine AI-empowered foreign language teaching within the framework of embodied cognition and to explore more effective models of human–AI co-teaching.

3. Dilemmas in AI-Empowered Foreign Language Teaching

Although AI is profoundly reshaping foreign language teaching, its "empowering" effect is far from unidirectional. As a technological form centered on data and algorithms, AI not only improves efficiency and optimizes feedback but also subtly reshapes the structure and logic of learning. In contrast, foreign language learning itself is a highly complex process that relies on bodily experience, requires contextual engagement, and generates meaning through interaction. This fundamental incompatibility gives rise to multiple dilemmas in the practical implementation of AI-enabled foreign language teaching.

3.1 The Conflict Between "Disembodied" Technological Rationality and "Embodied" Educational Goals

Human cognition is far from being constituted solely by standardized, systematic, and explicitly expressible knowledge. As Michael Polany points out, all knowledge is either tacit or rooted in tacit knowledge. A large amount of knowledge exists in tacit form and cannot be fully articulated through language or symbols; thus, tacit knowledge largely depends on bodily sensation and judgment.

Implicit knowledge embedded in bodily experience is inherently difficult to quantify. It does not rely on symbolic expression; its meaning is always situated in specific contexts and continuously evolves through interaction between the individual and the environment. While technological systems are adept at processing structured and formally organized information, they struggle to capture the vague, context-dependent, and continuously emergent aspects of bodily experience.

Education, at its core, aims to cultivate individuals with rich life experience and perceptual self-awareness. Learning is not merely the reception of information, but a practice that unfolds through emotional interaction and situated engagement in embodied coexistence. In contrast, the intervention of artificial intelligence is transforming what was once a complex and open educational ecosystem into a data-driven operational system, whose core logic lies in computation and the enhancement of predictability and controllability in order to maximize efficiency.

The penetration of technological rationality into education brings previously unquantifiable aspects of learning into a computable framework, thereby reshaping the nature of learning. In foreign language teaching, the widespread use of adaptive systems and automated assessment tools reduces learning behaviors to quantifiable indicators such as study duration, completion rates, and test scores, while teaching processes increasingly rely on data analysis and algorithmic recommendations. However, what can be captured in this way is only surface-level information; bodily perception that cannot be symbolized, the sense of participation within context, and the generation of linguistic meaning are excluded. This disembodied technological logic stands in inherent conflict with the embodied goals that education should pursue. As Long and Doughty (2003) in their discussion of language learning mechanisms, "language learning… is ultimately a matter of change in an individual's internal mental state". Ultimately, true learning is not merely the acquisition of knowledge, but also the continuous formation of experience and internalization of abilities throughout the process, as well as the gradual construction of one's relationship with the mind and with the surrounding world.

3.2 Functional Limitations of AI and the Absence of Bodily Experience

Generative artificial intelligence (GAI) has demonstrated significant advantages in foreign language teaching, particularly in enabling real-time interaction and adaptive learning support. It can automatically generate and transform linguistic content, dynamically adjust task difficulty according to learners' proficiency, and provide continuous interaction and immediate feedback. These affordances align closely with the core demands of language learning, including

accurate input, frequent opportunities for interaction, and timely feedback. Notably, GAI can also, to some extent, reduce the "affective filter" in the learning process. By creating a relatively low-anxiety environment for language practice, it allows learners to experiment and make mistakes with less psychological burden, thereby encouraging more active use of the target language. In this sense, GAI effectively compensates for the delayed feedback characteristic of traditional instruction, forming a real-time loop of "monitoring–feedback–adaptation" that meets the need for immediacy in knowledge acquisition.

Despite these advantages, the limitations of AI in foreign language teaching require critical attention. Functional constraints in AI tools may reduce teachers' perceived ease of use (PEOU) (Li & Lei, 2026). Although GAI systems are comprehensive in scope, they often lack domain-specific precision in pedagogically complex contexts such as language teaching. Given the multi-layered and highly systematic nature of foreign language instruction, teachers frequently need to switch between multiple tools to assemble a complete instructional process. This fragmentation increases operational complexity and diminishes teachers' perception of usability.

AI also exhibits clear limitations in emotional expression and contextual understanding. While GAI excels at delivering information and providing immediate feedback, it remains inherently limited in emotional comprehension and cultural sensitivity. Language communication is not merely the transmission of symbolic information; it involves tone, eye contact, subtle emotional shifts, and culturally embedded meanings. Existing studies indicate that GAI lacks intuition and affective capacity, demonstrating lower levels of empathy and cultural sensitivity compared to humans (Liu & Sui, 2025). As a result, learners are unlikely to obtain authentic emotional experiences through interaction with AI, nor can they engage in the irreplaceable processes of emotional resonance and cultural understanding inherent in real communication (Dai & Guo, 2023).

Cognition arises from the interaction between the embodied subject and the world. As Goodwin (2003) notes, "the positioning, actions, and orientation of the body in the environment are crucial to how participants understand what is happening and build action together". A teacher's gesture, a student's facial expression, and any form of bodily interaction constitute integral components of cognition itself. The transmission of knowledge in educational settings follows the same principle. A text may be printed on paper, and knowledge points may be written on the board, but genuine understanding cannot be achieved through symbols alone; learners must engage in situated practices of creation, expression, and trial-and-error.

The reliability of AI-generated information remains highly uncertain. At present, GAI lacks the capacity to distinguish between true and false information. Instead, it infers user intent from contextual cues and continuously adjusts its responses, sometimes producing inaccurate or misleading outputs. This limitation stems from the fact that GAI does not generate responses based on factual judgement, but rather on probabilistic models trained on large-scale corpora. In language learning contexts, such expressions—accurate in form yet distorted in content—can be highly misleading. Learners often struggle to promptly identify errors within them, thereby unconsciously internalizing inaccurate or biased information.

3.3 Imbalance in Human–AI Relations and the Alienation of Educational Subjectivity

The imbalance in human–AI relations is increasingly threatening the integrity of educational subjectivity. Li Lingling et al. (2026) point out that while AI enhances educational efficiency, it also gives rise to a crisis of subject alienation among both teachers and students, compressing the space for interaction and value-oriented guidance. This shift not only affects learners' autonomy but also poses new challenges to teachers' professional judgment and classroom engagement.

Student subjectivity is gradually weakened under conditions of technological dependence. In educational settings that should foster creativity, students develop a sense of subjectivity through questioning, expression, and trial-and-error. However, GAI is subtly reshaping the learning environment. As GAI can respond almost instantaneously to knowledge-based queries, learners may shift from "thinking for themselves" to "receiving from the system". The space for insight within the thinking process is compressed, and learning risks degenerating from active engagement into passive reception.

Students' modes of thinking are also implicitly constrained by technological reliance. When learners repeatedly follow solution paths pre-structured by technological systems, their thinking tends to follow fixed solution paths and rely on predefined frameworks of reasoning and choice. Over time, such patterns may limit students' willingness to explore alternative ways of thinking, hindering the development of creative thinking and reducing their ability to interpret complex situations from multiple perspectives.

Adaptive learning systems are also silently reshaping learners' learning values. GAI typically relies on data screening and algorithmic recommendations to output learning pathways, while humanistic dimensions that are difficult to quantify—such as aesthetic ability, moral judgment, and emotional resonance—are often excluded from the core evaluation mechanism. This technological logic essentially violates the "monitor hypothesis", leading to a weakening of language internalization capabilities (Li & Lei, 2026). By focusing solely on outcomes rather than processes, and prioritizing efficiency over meaning, learners may gradually adopt an instrumental view of learning centered on performance and results. This shift in value orientation further constrains the development of subjectivity, posing unprecedented challenges to the educational goal of holistic human development.

At the level of instructional practice, teachers' professional judgment is increasingly shaped and at times constrained by their reliance on technological systems. Because AI-generated feedback is immediate and appears precise, both teachers and students often come to treat it as authoritative. As a result, the decision-making space traditionally occupied by teachers is

compressed. For instance, when a system indicates that "the student has achieved only 65% mastery of this content and recommends Unit 3 review exercises", teachers' ability to draw on professional experience, contextual understanding, and knowledge of individual learners is significantly reduced. Over time, this can shift the teacher's role away from making pedagogical judgments toward carrying out recommendations generated by the system.

Classroom interaction also faces the risk of attenuation under excessive technological intervention. Li Xue and Gu Xiaole (2024) argue that overly technologized environments may weaken authentic communication between students and teachers, as well as among students themselves, thereby reducing opportunities for language use in real contexts. Although intelligent systems can provide abundant and personalized resources, overreliance on technology may reshape or even displace traditional patterns of classroom interaction. Developing communicative competence is a central goal of foreign language education (Yin & Miao, 2018), and language acquisition cannot be reduced to one-way input. As human–machine interaction begins to take the place of human–human communication, learners may become less engaged and less active in the classroom, which in turn can limit the development of their communicative competence. Ultimately, language is developed through interaction with others—something AI still struggles to replicate.

4. Returning to the Nature of Second Language Acquisition from an Embodied Cognition Perspective

After reflecting on the challenges brought about by AI in language teaching, it is necessary to return to learning itself and reconsider the nature of language acquisitionfrom the perspective of cognitive mechanisms. Embodied cognition offers a useful way of approaching this issue.

4.1 Embodiment of Cognition: The Bodily Foundation of Language Acquisition

The concept of embodied cognition redefines the foundation of language acquisition. Traditional cognitivism compares the human brain to a computer, treating the body merely as an input–output device—for instance, the eyes and ears receive information, while the hands and mouth simply execute commands. In contrast, embodied cognition theory argues that cognitive processes such as perception, thinking, and evaluation are coupled with the body's sensorimotor system. As Wang Qian (2016) notes, "cognition depends upon the kinds of experience that come from having a body with various sensorimotor capacities", highlighting that cognition does not arise in nowhere but is rooted in the experiences gained through bodily interaction with the world. This view echoes an earlier insight from Comenius, who argued that all knowledge begins with the senses: when we observe the structure of a flower or feel the texture of a stone, we are already engaging in real thinking.

Embodied participation is central to the development of language ability. Learning a foreign language is not merely a mental activity. learners must engage with real sounds, articulate speech, feel their own articulatory movements, observe others' facial expressions and tonal variations in authentic communication, and construct language ability through these concrete actions. Language sense, fluency, and communicative norms do not emerge automatically from knowing and accepting rules; rather, they are gradually internalized through countless cycles of observation, listening, speaking, and adjustment.

Language competence is also rooted in accumulated bodily experience. Although humans can process abstract concepts and think about "not present-at-hand" entities (Clark, 1999), this ability does not exist independently of the body; rather, it develops through long-term perception–action experience and situated interaction. In vocabulary learning, for instance, words that are closely tied to lived emotional experiences, or to memories of making mistakes, being corrected, and hearing how native speakers use them, are more easily retained. Such embodied memories help reactivate meaning and deepen learning. By contrast, when learning is detached from bodily experience, learners often find it difficult to apply what they know in practice. Knowledge then becomes mechanical, and the flexible use of language in real contexts remains limited.

4.2 Experiential Construction in Second Language Acquisition: Interaction of Body, Context, and Meaning

The experiential construction of second language acquisition is manifested in the dynamic interplay among body, space, and meaning. Conceptual Metaphor Theory suggests that humans rely on concrete bodily experience to understand abstract concepts, constructing meaning through experiential structures such as space and movement (Lakoff, 1980). This cognitive mechanism operates widely in language comprehension. For instance, people often unconsciously draw on basic spatial experiences such as "up–down," "front–back," and "deep–shallow" to make sense of abstract ideas. This helps explain why immersive and multisensory learning is often more effective than rote vocabulary memorization.

Empirical studies further support the cognitive effects of spatial metaphors. Research on Chinese learners of English shows that when processing words related to "power", learners automatically activate vertical spatial mappings. When such words appear in higher positions, consistent with the metaphorical meaning of "high status", a significant "word–space interaction effect" is observed (Wang, 2016), and the processing becomes faster and more fluent. This finding indicates that the comprehension of word meaning does not rely solely on linguistic symbols. Instead, immediate, spontaneous, and involuntary spatial schema construction directly participates in and shapes how information is understood and processed.

However, there is a clear difference in the degree of bodily involvement between first language acquisition and second language learning. First language acquisition typically occurs in colorful and fragmented everyday interactions, where language is naturally tied to bodily actions and lived experience, from eating and playing to exploring the environment. In contrast, second language learning often takes place in highly condensed and simplified classroom contexts, where instruction relies heavily on symbolic definitions and translation strategies. While efficient, this

approach tends to reduce language learning to mechanical memorization, making it difficult for learners to use language flexibly in real and complex communicative situations.

Emotional experience is another important pathway for the embodiment of meaning. Embodiment does not rely solely on physical action. In fact, many words, such as “joy”, “fear”, and “loneliness”, inherently carry strong emotional connotations. Personal emotional experiences—for example, when a word is associated with moments of intense joy or frustration—can anchor meaning deeply in the body and mind (Katharina & Gianelli, 2019). In the formation of linguistic meaning, bodily perception provides the most immediate sensory foundation, spatial mappings offer a cognitive framework for structuring abstract relations, and emotional experience infuses meaning with evaluative depth. Together, these three dimensions constitute a multi-layered experiential foundation for second language acquisition.

4.3 Embodied Learning Environment: The Ecosystem of Second Language Acquisition

Language learning is rooted in a learning ecosystem where the body and environment are deeply intertwined and co-evolve. It is not an isolated mental event but emerges from ongoing interactions among the individual, the physical environment, others, and the broader sociocultural world. Learning takes place within this dynamic network of interwoven relationships.

The sociocultural perspective highlights the constructive role of context, emphasizing the dynamic interaction among perception, action, the body, and the environment (Lan et al., 2015). From this view, language comprehension is understood as a form of cognition grounded in bodily simulation: when interpreting sentences, learners spontaneously “re-enact” the actions and situations described. This aligns with the indexical hypothesis, which holds that understanding depends on linking words to perceptual experience and action patterns, thereby generating meaning within context.

The learning environment itself continuously shapes how we understand. Embodied cognition conceptualizes it as a nested system: the mind is embedded in the brain, the brain in the body, and the body in the environment (Li et al., 2018). This system includes physical space, resources, emotional climates, and sociocultural contexts that interact and reinforce one another. For instance, a well-designed space, such as round tables for group work, can foster interaction and a more open and relaxed emotional atmosphere. Through participation and situated experience, learners progressively construct and deepen linguistic meaning.

Cognitive activity is fundamentally a process of internal–external interaction. Learners’ development is driven by two interwoven processes (Lewis & Mendelsohn, 1994): environmental stimuli support outside-in processing, while learners actively interpret input through their existing knowledge, experiences, emotions, and intentions in an inside-out process. Rather than occurring sequentially, these processes operate in continuous interaction, jointly shaping cognition and language acquisition.

5. Reconstruction the Human–AI Co-Teaching Model

With the continuous integration of AI into educational practice, the language classroom is shifting from a traditionally teacher-centered structure to a multi-participant learning environment involving teachers, students, and intelligent technologies. This transformation has fundamentally reshaped patterns of classroom interaction. Accordingly, reconstructing a human–AI collaborative teaching model requires not only leveraging AI’s strengths in data processing, but also preserving the teacher’s central role in guiding learning and designing meaningful contexts. The key lies in achieving a balance between technological efficiency and the humanistic value of education through effective instructional design.

5.1 Human–AI Collaboration in Knowledge Construction

Human–AI collaboration reshapes the mode of knowledge production. In foreign language teaching, the classroom is no longer confined to one-way transmission from teacher to student, but is increasingly characterized by interaction among teachers, learners, and intelligent technologies. With its powerful capabilities in data processing and analysis, AI provides learners with extensive linguistic resources, real-time feedback, and personalized learning pathways. Meanwhile, teachers play an irreplaceable role by creating authentic learning contexts and communicative tasks that foster learners’ deep understanding of linguistic meaning.

Such collaboration gives rise to a form of collective intelligence that transcends individual contributions. From the perspective of knowledge production, outcomes in human–AI collaboration do not originate from a single source, but from the integration of multiple interacting elements. Zhang et al. (2024) characterize this process as “the emergence of collective intelligence”, rather than a simple sum of teacher expertise, student input, and AI technology. AI can support learners’ language production through visualization tools and real-time feedback, while teachers organize activities such as group discussions and role-playing that require genuine interaction and cooperation. In these contexts, learners must use language to communicate, persuade, and collaborate, thereby deepening their understanding of meaning. Through such a division of roles, language learning moves beyond passive listening and mechanical exercises.

The ultimate goal of foreign language learning is to promote the transfer of knowledge into real communicative competence. At the stage of innovative transfer, human–AI collaboration can further extend and apply learning outcomes. As the educational philosopher Whitehead argues, a central task of education is to enable students to apply classroom ideas to real life; otherwise, knowledge cannot truly become a resource for personal development. AI can simulate authentic communicative situations in a low-risk environment, such as ordering in an overseas café or writing a greeting email to an international friend. The teacher’s role is not to provide standard answers, but to design open-ended tasks and guiding questions that help students reflect on the appropriateness and effectiveness of their expressions. Through continuous attempts and adjustments, learners gradually develop the

ability to select appropriate expressions across contexts, enabling language competence to transfer into real-life use.

5.2 Functional Coordination and Role Reconfiguration in Teaching

The structure of teaching is shifting from a single dominant actor to a more collaborative, multi-agent model. As artificial intelligence becomes part of the classroom, the traditional teacher-centered approach is gradually giving way to a more distributed form of instruction. In this new setting, the key question is how to organize effective collaboration—between humans and machines, as well as between teachers and students.

The effectiveness of such a system depends on how well different roles complement one another. From a systemic perspective, educational outcomes are not simply the sum of individual components; they emerge from coordinated interaction. Cremin (1976) introduced the idea of "ecological niche complementarity", emphasizing that different actors contribute in distinct ways, and that it is precisely this differentiation that sustains the system's balance and vitality. This provides a useful lens for thinking about human–AI collaboration in education.

At the core of human–AI collaboration is the alignment of strengths. In AI-supported language classrooms, AI is well suited to processing information and analyzing learning data, while teachers are better positioned to manage the pace of instruction, design meaningful and appropriately challenging tasks, and build supportive, trust-based relationships with students. When routine and lower-level cognitive work is handled by AI, teachers can focus more on higher-level activities—facilitating in-depth discussion, encouraging critical thinking, and guiding meaningful interaction. In this way, efficiency can be improved without sacrificing the depth of learning.

Teachers, in turn, need to actively adjust their roles within this collaborative framework. Rather than simply adapting to new technologies, they need to develop the capacity to use them thoughtfully and critically. Professional development should move beyond basic technical training toward a more integrated model that brings together pedagogy, technology use, and ethical reflection. At the same time, teachers need to remain alert to the risks of fragmented knowledge and ensure that academic rigor is maintained.

At its core, language learning depends on bodily engagement and real interaction. Genuine language ability develops through use—through doing and interacting in context (Zhao, 2025). For this reason, classroom practice needs to place renewed emphasis on context and interaction. No matter how advanced the technology becomes, one of the teacher's central roles remains the same: to design tasks that require discussion, collaboration, and problem-solving, and to guide students in using language to act in the world. Only in this way can language learning return to its basis in social interaction and practical use.

5.3 Responsibility Sharing in AI-Empowered Teaching Environments

The integration of AI is reshaping how responsibility is distributed in teaching. As AI becomes more widely used in the classroom, it does more than change instructional formats—it also challenges long-standing assumptions about who is responsible for what. In the past, most decisions and responsibilities rested with the teacher. Now, with AI involved in analyzing learning data, providing feedback, and even informing certain decisions, teaching is becoming a collaborative process involving multiple actors. As a result, questions of responsibility are no longer straightforward.

In information ethics, Floridi (2019) introduces the idea of "distributed moral responsibility" to explain how responsibility is structured when technological systems take part in social practices. From this perspective, technology itself is not a moral agent—it does not possess awareness or intention—but operates within a broader network of human actors, institutional arrangements, and technical systems. Responsibility, therefore, does not lie with any single agent but needs to be allocated and shared across those involved.

In AI-supported teaching, responsibility takes on a networked form. AI systems function as assistants that depend on human design and oversight, rather than as autonomous decision - makers. Their strength lies in processing large volumes of data and carrying out specific tasks efficiently — for example, providing instant feedback on assignments or recommending relevant learning materials. At the same time, it is important to recognize that these outputs are shaped by human-designed models and past data; they do not reflect genuine pedagogical understanding. For this reason, AI-generated results always require human judgment and oversight.

Teachers remain at the center of the teaching process and bear ultimate responsibility. The use of technology does not diminish this role; if anything, it makes it more critical. An AI system might infer from a set of assignments that a student has mastered a particular concept, but teachers are better positioned to judge whether the student truly understands it, has only arrived at the correct answer by chance, or has retained it only temporarily. Such distinctions often fall beyond what data alone can capture. Knowing when to rely on AI suggestions and when to intervene is itself a key professional competence—one that cannot be replaced by technology. As AI becomes more deeply embedded in education, it is increasingly important for teachers to remain aware of how these systems work and to retain control over pedagogical decisions.

Educational institutions, in turn, are responsible for governance and oversight at a systemic level. The introduction of AI raises a range of new issues: how to protect students' data privacy, how to address biased or misleading recommendations, and where teachers can turn for support when problems arise. These are not challenges that individual teachers can handle alone. Schools and relevant educational authorities therefore play a crucial role in ensuring that AI is used appropriately, responsibly, and ethically. This involves establishing clear policies, implementing careful technical management, and conducting ethical review, so that the technologies adopted in schools are reliable and do not shift risks onto teachers and students.

Overall, building a clear and well-coordinated framework of shared responsibility is essential for making effective and sustainable use of AI in education. Only in this way can technological innovation remain aligned with the fundamental goal of education: supporting human development without losing sight of its core purpose.

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