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From learner autonomy to hybrid autonomy: A research agenda

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Abstract

This conceptual article proposes the construct of hybrid autonomy to describe how control, agency, and reflection are increasingly distributed between learners and artificial intelligence systems in language learning. While learner autonomy has traditionally been understood as the capacity to take charge of one's own learning, the growing integration of generative AI, conversational agents, adaptive systems, and learning analytics reshapes how autonomous learning is manifested. Rather than viewing AI as either enhancing or diminishing autonomy, the article argues that AI transforms the ecology of control by redistributing cognitive, evaluative, and regulatory functions across human and non-human actors.

Drawing on research in learner autonomy, computer-assisted language learning, distributed cognition, hybrid intelligence, and AI-mediated language learning, this article synthesizes recent empirical and theoretical developments to examine how AI influences the cognitive, affective, social, and technological dimensions of autonomy. Particular attention is paid to emerging tensions between empowerment and dependency, personalization and standardization, and agency and algorithmic guidance.

The article further examines implications for pedagogy, assessment, teacher roles, and institutional policy, arguing that autonomy in AI-rich environments depends not simply on access to intelligent tools but on learners' ability to critically negotiate, interpret, and regulate their interactions with them. The article concludes by outlining a research agenda for investigating hybrid autonomy in language education, including directions for studying shared agency, evaluative judgement, AI-supported self-regulation, learner identity, and the distribution of cognitive labour in human–AI interaction.

Keywords: learner autonomy, hybridity, heutagogy, artificial intelligence

Introduction

Autonomy has long been one of the defining ideas of language education and a powerful lens for understanding how learners plan, monitor, and evaluate their learning both inside and beyond the classroom. Research over four decades has expanded this lens from individual self-direction and self-regulation to social, ecological, and identity-based perspectives (e.g., Gao & Zhang, 2022; Murray & Lamb, 2018), and, more lately, to complexity perspectives (Stringer, 2025). In parallel, the technological environments through which learners exercise autonomy have diversified, moving from self-access centres and online courses to mobile learning, informal digital ecologies, and, most recently, artificial intelligence (AI). The 2017 *Language Teaching* research agenda on language learning beyond the classroom (Reinders & Benson, 2017) mapped a field in which learners increasingly constructed their own learning ecologies through digital and social networks. Since then, the rise of generative AI has introduced a new kind of learning environment, one in which learners collaborate not only with peers and teachers, but also with adaptive, conversational, and semi-autonomous systems.

The question of *control* has long been central to autonomy research and has now become more complex (Benson & Reinders, forthcoming). Learners share decision-making and meaning-making processes with algorithms that generate feedback, suggest resources, and participate in L2 interaction. These developments challenge assumptions underpinning established understandings of learner autonomy, many of which were developed within contexts where learners were the primary locus of cognitive, evaluative, and regulatory activity. Recent studies in language education have pointed to a need for a reconceptualization of self-regulated learning and autonomy (see for example Zhang et al.'s recent systematic scoping review, 2025). The forms of freedom learners experience in AI-mediated environments are not merely digital extensions of earlier self-directed learning but instead involve operating under conditions where human agency is exercised through artificial systems. This paper proposes the term *hybrid autonomy* to capture the ways in which control, initiative, and reflection are now distributed between human and non-human actors in the language learning process.

The purpose here is not to argue that AI necessarily diminishes (or enhances) learner autonomy, but to recognise that it transforms the notion of what it means to act autonomously. Autonomy is becoming hybrid; something that is negotiated and developed, shared rather than owned, mediated rather than purely self-directed. The challenge for language education is to understand how this hybrid autonomy can be fostered, recognised, and sustained.

In what follows I adopt an integrative conceptual approach, drawing together empirical findings, theoretical perspectives, and emerging debates from multiple related fields. Rather than reporting original experimental data, the aim is to identify converging patterns across existing research and to examine how recent developments in artificial intelligence challenge assumptions underpinning established understandings of learner autonomy, thus offering a conceptual synthesis and theoretical reframing.

The analysis proceeds in four stages. First, the article traces major conceptual developments in learner autonomy research, moving from individualistic understandings toward ecological, distributed, and sociomaterial perspectives. Second, it reviews recent research on AI-mediated language learning, including work on generative AI, conversational agents, adaptive feedback, learning analytics, and self-regulated learning. Third, it examines the implications of these developments for pedagogy, assessment, institutional policy, and learner agency. Finally, I propose a research agenda for investigating hybrid autonomy in language learning environments where cognitive, evaluative, and regulatory processes are increasingly shared between learners and intelligent systems.

Conceptual Shifts in Learner Autonomy

The foundations of autonomy theory were laid in the late 1970s and early 1980s. Holec's (1981) definition of autonomy as "the ability to take charge of one's own learning" (p. 3) placed responsibility and decision-making at the centre of language education. Autonomy was associated with the democratisation of learning, self-instruction, and the learner-centred turn in language pedagogy. In these early formulations, autonomy was both a pedagogical method and a moral stance: the belief that learners should have the right and the capacity to make decisions about their learning goals, materials, and evaluation. Little (2007) and Benson (2011) broadened this view by situating autonomy within social and political contexts, emphasising that freedom in learning cannot be separated from institutional structures, cultural expectations, and power relations. Reinders (2020) later noted that the capacity for autonomy is always mediated by context. Learners exercise control not in isolation but through negotiation with teachers, peers, and technologies.

By the early twenty-first century, autonomy research had undergone what Murray and Lamb (2018) called an "ecological turn." Building on the sociocultural theory of Vygotsky (1978) and on complexity and systems thinking (van Lier, 2004), this turn reconceived autonomy as an emergent phenomenon arising from interaction rather than a fixed personal trait. Learners were understood to act within overlapping spaces, including classrooms, online communities, workplaces, and informal digital environments, where agency is distributed across people, tools, and artefacts. Chik et al. (2018) and Little et al. (2017) foregrounded this as an ongoing negotiation of control and interdependence, in which autonomy develops through participation and dialogue. The theoretical convergence with distributed-cognition research (Hutchins, 1995) and actor-network theory (Latour, 2005) further reinforced the idea that agency is networked rather than individual. Language learning thus came to be recognised as one of many human activities that unfold through socio-material configuration of learners, communities, and technologies.

As technologies became integral to communication, autonomy also came to be seen as technologically mediated. Mobile learning, self-access centres, and online communities offered new affordances but also came with challenges. Early digital environments were celebrated for empowering self-directed learners, yet they also revealed the unevenness of autonomy across contexts. Reinders (2023) argued that technology provides the conditions for autonomy but does not guarantee its manifestation; successful self-directed learning depends on scaffolding, metacognitive awareness, and teacher mediation. With the rise of artificial intelligence some of these processes are potentially offloaded from learners and teachers to external tools. With these developments the technological dimension of autonomy has now clearly moved from background to foreground. AI systems are not static tools but adaptive agents that respond to, and sometimes anticipate, learner behaviour. They offer feedback, curate materials, and generate linguistic input, transforming how control is negotiated in the learning process.

Hybrid-intelligence research provides a theoretical lens for understanding this transformation. Cukurova et al. (2025) and Dellermann et al. (2019) describe hybrid intelligence as a partnership in which human and machine intelligences complement one another through iterative collaboration. In such arrangements, cognitive control becomes dynamic and shared: humans contribute contextual understanding, creativity, and ethical reasoning, while AI provides computation, pattern recognition, and generative capacity. Applied to language learning, this perspective suggests that autonomy no longer resides entirely with the learner but instead manifests in a partnership. Learners plan, monitor, and evaluate their learning in dialogue with systems that offer suggestions or corrections derived from large data sets. The notion of

“taking charge” of one’s learning thus acquires a new complexity when the learning partner can also take charge.

This development requires re-examining the meaning of self-direction. In the early digital era, autonomy was associated with self-access and independent study, with learners choosing materials and pacing their work. In the networked world described by Lai (2023), autonomy became a matter of managing learning across multiple platforms and social spaces. Artificial intelligence introduces a further evolution: learners now co-regulate their actions with adaptive systems that share in planning and feedback in a process of *calibration* between human initiative and algorithmic support (Luckin, 2025). Optimal learning occurs when control oscillates between learner and system rather than resting exclusively with either. Papi and Hiver’s (2024) proactive learning model operationalises this calibration through four observable agentic behaviours: input-seeking, interaction-seeking, information-seeking, and feedback-seeking. When AI systems mediate these behaviours, autonomy consists in the ability to decide how much to delegate, how to interpret assistance, and when to reassert independent judgment.

Alongside these shifts in agency, the reflective core of autonomy has also been transformed. For Little (2007) and Wenden (1991), reflection was the mechanism by which learners internalised control through planning, monitoring, and evaluation. The data-rich environment of contemporary education recasts reflection as a partly automated process. Dashboards, analytics visualisations, and adaptive feedback externalise metacognition, offering learners continuous insight into performance but also imposing algorithmic interpretations of progress. Research in learning analytics shows that such representations enhance self-regulation when learners engage with them critically but reduce agency when accepted uncritically (Jivet et al., 2017; Verbert et al., 2014). In language education, Shi and Aryadoust (2024) found that students often adopt system feedback without questioning its validity, leading to a decline in self-evaluation skills. Reflection in the age of AI thus runs the risk of becoming ‘datafied’. Autonomy now entails not only metacognitive capacity but also the ability to interpret and, when necessary, challenge this data.

The reconceptualization of autonomy as relational has also foregrounded questions of design. Early approaches treated autonomy as a personal competence that could be transferred across contexts (Dam, 2011). Ecological and sociocultural perspectives reframed it as a relation that depends on environmental affordances (Tassinari, 2015). In AI-mediated environments, this relation is literally designed into systems. Cukurova (2025) argues that autonomy therefore becomes a design property determined by transparency, interpretability, and the learner’s capacity for choice. No account of autonomy is complete without considering its emotional dimension. As control becomes shared with machines, the affective conditions of learning gain new importance. Perceived autonomy is strongly correlated with positive emotion, self-confidence, and willingness to communicate (Zarinnabadi et al., 2021). Within AI-enhanced learning, trust, curiosity, and enjoyment encourage learners to experiment with technology, while anxiety and frustration lead to dependence or withdrawal (Kohnke et al., 2024). These findings align with Self-Determination Theory (Deci & Ryan, 2022), which positions autonomy as one of three basic psychological needs underlying intrinsic motivation. Maintaining that sense of volition in human-AI partnerships requires a careful emotional balance: learners must perceive the system as a supportive collaborator rather than as (merely) an authority.

The convergence of these developments suggests that autonomy can no longer be defined solely as individual independence or self-regulation. It is a dynamic configuration of human intention, social relation, technological design, and affective experience. The concept of hybrid

autonomy captures this complexity. It refers to the capacity of language learners to negotiate, share, and re-appropriate control within human-AI systems in pursuit of personally and socially meaningful goals. This reflects a shift from freedom as independence to freedom as negotiated participation in increasingly intelligent learning environments.

Research on Autonomy and AI

In the last three years investigations of how AI mediates learner control, motivation, and reflection have emerged across a wide range of contexts, from classroom experiments with automated feedback systems to studies of learners' self-directed use of chatbots, apps, and generative tools in everyday life. The field remains heterogeneous, drawing simultaneously on traditions of computer-assisted language learning (CALL), informal digital learning, learning analytics, and (to a lesser extent) hybrid intelligence. Yet across these diverse lines of inquiry, a coherent picture is beginning to emerge: artificial intelligence can expand opportunities for agency, practice, and feedback, while also redistributing the reflective and decision-making processes that once defined autonomy.

The most extensive body of evidence comes from studies on writing and feedback. A systematic review by Huawei and Aryadoust (2024) synthesised more than eighty studies in language education on AI-based automated written feedback. It found consistent gains in linguistic accuracy and text quality, but also wide variation in how learners engaged with the systems. Some used AI-generated feedback to refine their arguments and experiment with expression; others accepted corrections automatically without reflection. The authors conclude that self-regulation is strengthened only when feedback systems are transparent and learners are invited to interpret or justify revisions. This conclusion is echoed in experimental work comparing generative and rule-based tools. Shi et al. (2025) and Kohnke (2024) both observed that generative tools such as ChatGPT promote rapid revision but may foster dependence and reduced authorship, particularly when learners view the AI as an evaluator rather than a collaborator. The same tension appears in general education research, where Luckin (2025) describes an “automation paradox”: AI increases productivity but can dampen metacognitive effort. These findings suggest that autonomy depends less on feedback efficiency than on learners' critical engagement with AI-generated suggestions.

Speaking and interaction studies provide similar insights. Dialogue-based CALL systems and conversational agents have been investigated as low-stakes environments for oral practice. Both Zhang et al.'s (2023) and Hou and Min's (2025) meta-analyses report moderate effect sizes for language development, with Du (2025) in particular showing a strong impact. She used a pretest–posttest experiment involving 203 EFL students and demonstrated that the use of chatbots led to significant improvements in goal-setting, monitoring, and reflection) as well as retention of (vocabulary grammar, with the experimental group receiving adaptive feedback outperforming the participants who did not receive adaptive feedback. However, systems often predetermine topics and control turn-taking, creating a sense of fluent interaction that conceals the learner's diminished influence over content. In classroom settings, Liu and Reinders (2025) have shown that chatbots can maintain conversational flow and reduce anxiety but also lead students to defer to the system's agenda. These findings suggest that AI interlocutors may simultaneously expand opportunities for interaction while constraining learner influence over communicative direction.

Beyond formal instruction, the integration of AI into learners' personal digital environments has become a major focus. For example, Pan et al. (2024) describe how learners can be supported in their self-regulated learning with the help of AI chatbots and Dizon et al. (2022)

show the potential of Alexa for out-of-class Japanese learning. Studies of AI-mediated Informal Digital Learning of English (AI-IDLE) and its generative variants illustrate how emotions, self-efficacy, and AI literacy shape engagement (Lee & Lee, 2021; Liu et al., 2024; Yang & Zhao, 2024).

Across both formal and informal settings, emotion and motivation emerge as critical mediators. Large-scale quantitative studies continue to demonstrate that autonomy predicts foreign language enjoyment and willingness to communicate (Botes et al., 2025). In AI-enhanced contexts, enjoyment and curiosity appear to play a similarly enabling role. This can manifest in greater motivation where learners' self-determination needs are met. However, this is not always the case. Guan et al.'s (2024) meta-analysis of 15 studies of AI in informal digital learning of English showed that although there was an overall positive impact on learning outcomes, this was not the case for motivation. One prerequisite may be learner enjoyment. For example, Cui et al. (2025) found that learners who find generative tools interesting and manageable sustain use over longer periods and display higher willingness to communicate. They also note that this is highly context dependent and influenced by the extent of AI's affordances for specific tasks. Further, Wang et al. (2025) have shown that increased learner trust in AI has a positive impact on AI use. Drawing on Self-Determination and Control–Value theories (Deci & Ryan, 2022; Pekrun & Perry, 2014), researchers interpret these patterns as evidence that perceived choice and competence mediate the relationship between autonomy and achievement. When learners experience AI systems as partners that can be queried and customised, their intrinsic motivation and persistence increase; when they perceive the systems as prescriptive, motivation declines.

Overall, research suggests that autonomy remains central to effective language learning in the AI era, but it now operates through complex, negotiated relationships between human and artificial agents. This has a number of implications, including pedagogical ones, which we will now discuss.

Tensions and Implications of Hybrid Autonomy

Taken together, the research reviewed above suggests that AI-mediated language learning represents not simply an expansion of learner autonomy, but a reconfiguration of how autonomy is enacted, negotiated, and distributed. Across writing, speaking, feedback, and informal learning contexts, AI systems increase opportunities for self-directed practice, immediate support, and personalised learning pathways. At the same time, they redistribute cognitive, evaluative, and emotional labour between learners and intelligent systems in ways that complicate established understandings of agency and control. Autonomy outcomes therefore depend less on access to technology itself than on how AI systems are designed, interpreted, and integrated into pedagogical and institutional environments.

One important implication concerns the growing role of cognitive offloading in language learning. Research on learner autonomy has traditionally assumed that learners develop autonomy through active engagement in planning, monitoring, evaluating, and regulating their own learning. Contemporary AI systems increasingly participate directly in these processes by generating ideas, revising language, evaluating performance, and recommending learning pathways. While this may support participation and reduce cognitive load, it may also diminish opportunities for metacognitive engagement if learners begin to defer too readily to machine-generated suggestions. Recent studies have shown that learners sometimes accept AI-generated feedback with limited critical reflection (Huawei & Aryadoust, 2024; Shi et al., 2025). The issue is therefore not simply whether AI improves performance, but whether

learners remain actively involved in the reflective and evaluative processes through which autonomy develops.

This raises important implications for pedagogical design. AI-mediated tasks may need to incorporate explicit opportunities for learners to evaluate, reject, reinterpret, or adapt AI-generated suggestions rather than simply act upon them. Emerging research on AI-supported formative assessment similarly suggests that algorithmic feedback can enhance but not replace dialogic engagement in learning (Cukurova, 2025). In language learning contexts, AI-generated evaluation may therefore be most effective when embedded within broader feedback ecologies that include teacher mediation, peer interaction, and self-assessment. Transparency also becomes increasingly important. Learners need opportunities to understand how AI-generated recommendations and evaluations are produced, and to develop the confidence to question them when necessary (Pastorino-Campos & Saville, 2025; Chiu et al., 2024).

A second tension concerns the relationship between personalisation and standardisation. Although AI systems appear to tailor learning experiences to individual learners, their outputs remain shaped by training data, optimisation logics, and embedded assumptions about appropriate forms of language use and interaction. As Bulathwela et al. (2024) argue, algorithmic systems may standardise interaction even while appearing to personalise it. In language learning contexts, this raises important questions about linguistic diversity, learner voice, and the subtle shaping of communicative norms. Learners may experience increased flexibility while simultaneously orienting themselves toward increasingly homogenised forms of expression and interaction.

Related to this is the issue of algorithmic guidance and epistemic authority. AI-mediated interaction can create a strong sense of learner control while masking asymmetries in power and visibility. Learners may feel autonomous while increasingly relying on machine-generated norms of relevance, correctness, and appropriateness. The challenge is therefore not only technical but epistemic: learners and teachers need sufficient AI literacy to recognise how systems influence choices, frame possibilities, and shape patterns of participation. For teachers, this may require forms of professional development that move beyond operational competence toward critical AI literacy and pedagogical mediation (Jiménez Raya et al., 2024). Teachers are increasingly required not simply to use AI tools, but to evaluate, contextualise, and where necessary resist their pedagogical assumptions.

These tensions also extend beyond classrooms to broader institutional and social conditions. Trust in AI-mediated learning depends heavily on transparency around issues such as data privacy, authorship, and acceptable use (Viberg et al., 2025). At the same time, access to advanced AI systems remains uneven and shaped by infrastructure, cost, language dominance, and digital literacy. The expansion of autonomy opportunities for some learners may therefore coincide with the reinforcement of broader structural inequalities and the marginalisation of less-resourced languages and contexts (Bulathwela et al., 2024). Hybrid autonomy is therefore not simply an individual learner characteristic but an ecological phenomenon shaped by interactions among learners, teachers, institutions, policies, and intelligent systems.

This reconfiguration of autonomy as hybrid and distributed demands a simple but integrative framework. As shown in Figure 1, we can conceptualize hybrid autonomy as emerging at the intersection of learner agency, AI mediation, and shared educational aims. Each of these dimensions contributes to how control, initiative, and reflection are negotiated in AI-enhanced environments. The framework offers a visual synthesis of the conceptual shifts discussed above and provides a foundation for identifying critical areas for empirical investigation. The research agenda that follows builds directly on this synthesis.

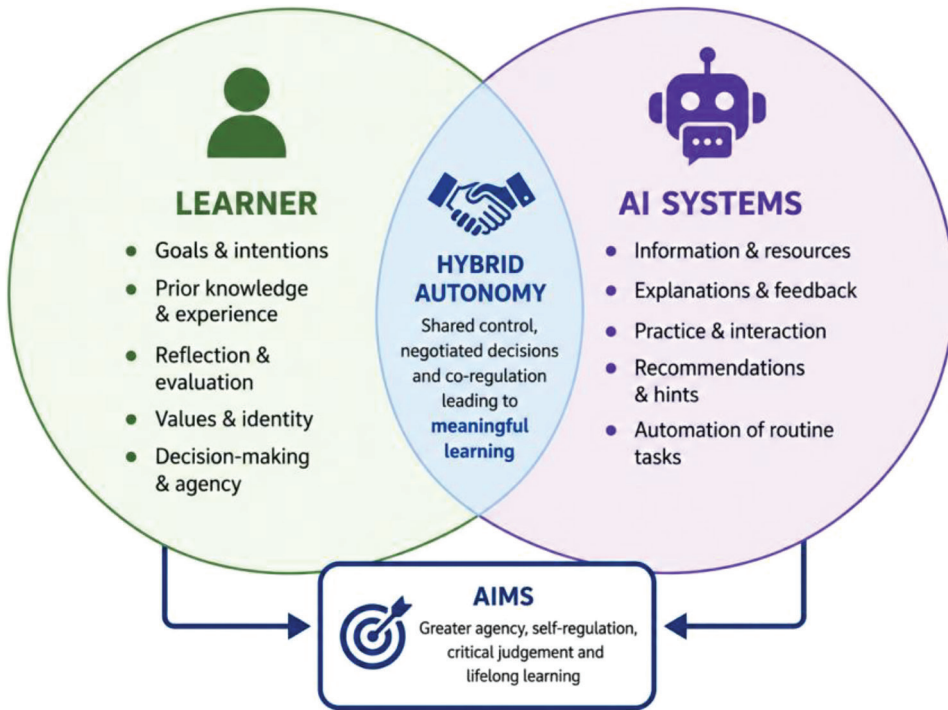


Figure 1. *Conceptual framework for hybrid autonomy in AI-mediated language learning*

Research Agenda: Investigating Hybrid Autonomy

The expansion of AI-mediated learning environments calls for renewed research into language learner autonomy under conditions where cognitive and regulatory processes are increasingly shared with intelligent systems. As shown, existing research suggests that AI can expand opportunities for feedback, interaction, and self-directed learning, while also reshaping how control and agency are exercised. The following research directions identify key areas for developing an empirical understanding of hybrid autonomy across AI-mediated language learning contexts.

Negotiating Control with AI Tools

One important line of inquiry concerns how learners negotiate control when working with AI systems during language tasks. Studies could examine when learners accept, modify, reject, or strategically sequence AI-generated suggestions while interacting with writing assistants, chatbots, or adaptive feedback systems. Using screen recordings, interaction logs, think-aloud protocols, and stimulated recall interviews, researchers could identify shifts in initiative, evaluative judgement, and decision-making responsibility across human–AI interaction.

Prior research has already identified emerging forms of shared agency between learners and AI tools, with learners developing distinct strategies for integrating and evaluating AI-generated content (Alm, 2024). Building on these findings, future work could investigate whether particular interaction patterns are associated with stronger language development or greater self-regulation. For example, learners who critically evaluate, adapt, or extend AI suggestions may demonstrate different developmental trajectories from those who rely more passively on machine-generated output. Correlating interaction patterns with measures such as writing quality, vocabulary development, communicative problem-solving, or self-regulation could

help operationalise hybrid autonomy in observable terms. Such research would also help identify the kinds of pedagogical support learners may require to maintain critical agency when intelligent systems become routine participants in language learning.

Long-term Cognitive Effects of AI Reliance

A further line of inquiry concerns the long-term cognitive consequences of sustained AI use in language learning. While AI systems may support learners through feedback, scaffolding, and task assistance, it remains unclear whether extensive reliance on such systems strengthens or weakens learners' own strategic and metacognitive capacities over time. Longitudinal studies could therefore investigate how sustained engagement with AI-mediated learning environments influences language development, self-regulation, and independent problem-solving.

One possible design would compare learners who regularly use AI tools for activities such as writing, reading support, or vocabulary learning with learners who rely primarily on traditional resources. Data collection could combine performance measures with learning diaries, interaction logs, reflective interviews, and self-regulation instruments. Researchers might examine changes in writing fluency, lexical development, transfer to unfamiliar communicative tasks, or the ability to revise and evaluate language independently.

Particular attention should be paid to changes in learners' strategic behaviour. For example, does frequent AI use enhance metacognitive awareness by providing continuous opportunities for feedback and reflection, or does it reduce independent strategy use by externalising key cognitive processes? Measures of cognitive load, delayed retention, and transfer performance may help identify whether certain forms of AI reliance lead to reduced engagement in practices essential for long-term language development. At the same time, AI may function as a form of adaptive scaffolding that gradually strengthens learners' capacities through modelling, feedback, and guided participation. Such research would help clarify the long-term cognitive implications of hybrid autonomy and the conditions under which AI supports or undermines sustained language learning development.

Affective Dimensions of Hybrid Autonomy

Autonomy has well-documented links to learners' emotional experiences in language study, including enjoyment, anxiety, and willingness to communicate, both offline and online (Botes et al., 2025). This task investigates how interacting with AI tutors or assistants influences these affective variables. An empirical study could introduce an AI conversation partner or writing assistant into an online language course and measure changes in students' emotional states and communicative behavior. For example, shy or anxious learners might practice speaking with an AI avatar for several weeks. Using pre- and post-intervention surveys (e.g. foreign language enjoyment scales, anxiety inventories, and willingness to communicate measures), researchers can detect shifts in emotion and confidence. Qualitative data, via interviews or journal entries, would provide insight into whether learners felt empowered or undermined by the AI's presence. The hypothesis is that an AI partner might reduce pressure as it is non-judgmental and infinitely patient. It is reasonable to expect this to increase enjoyment and lower anxiety as learners experiment more freely. We might see similar benefits if AI tools bolster students' sense of control (by offering help on demand) or their sense of competence (through instant feedback and experiences of success). Conversely, we must also investigate potential negative emotions: frustration or confusion can arise if the AI gives inappropriate responses, and some students might feel demotivated or over-reliant, especially once the novelty wears off. Prior studies note that AI tools can spark short-term motivation but also elicit frustration in learners when misused or misunderstood (Jeon, 2025). By triangulating emotion questionnaires, usage

logs (to see if, say, more AI use correlates with particular emotional trajectories), and perhaps physiological measures of stress during AI interactions, this project would paint a nuanced picture of the affective impact of AI-enhanced autonomy. The outcome will inform how to design AI-mediated tasks that maximize positive emotional engagement (e.g. enjoyment, willingness to communicate) while mitigating negative feelings like anxiety or frustration.

The Teacher's Role in AI-supported Autonomy

A further research direction concerns how teachers and learners negotiate autonomy in classrooms where AI tools become routine participants in learning activity. Although supporting learner autonomy has long been part of language teachers' pedagogical role, AI-mediated environments introduce new questions about guidance, authority, and the distribution of expertise between teachers, learners, and intelligent systems.

Classroom-based studies could examine how teachers mediate learners' interactions with AI tools during activities such as AI-supported writing, feedback, or conversational practice. Using classroom observations, discourse analysis, video recordings, teacher interviews, and learner reflections, researchers could investigate how teachers frame AI systems within classroom interaction and how they intervene when learners engage with AI-generated suggestions or feedback. For example, teachers may encourage learners to critically evaluate AI outputs, compare them with alternative interpretations, or reflect on the assumptions embedded within machine-generated responses.

Such research would also help clarify how teachers negotiate emerging shifts in pedagogical authority. AI systems may reduce teachers' roles as primary sources of linguistic knowledge while increasing the importance of higher-order mediation, critical guidance, and metacognitive support. At the same time, tensions may arise when AI-generated recommendations conflict with teachers' pedagogical intentions or when learners place greater trust in automated feedback than in human expertise. Investigating these dynamics would contribute to a better understanding of how hybrid autonomy is co-constructed within teacher–learner–AI relationships and what forms of pedagogical mediation are required to support critical and sustainable AI use in language learning.

Collaborative Autonomy in AI-mediated Group Learning

Autonomy in language learning is not solely an individual phenomenon but is also negotiated socially through interaction with peers, teachers, and increasingly, intelligent systems. An important research direction therefore concerns how AI participation reshapes the distribution of agency, decision-making, and responsibility within collaborative language learning activities.

One possible line of inquiry would examine small-group tasks in which learners work with AI-supported tools during activities such as problem-solving, collaborative writing, or speaking practice. Comparative designs could investigate differences between groups with access to generative AI support and groups relying solely on human collaboration. Using interaction analysis, discourse analysis, screen recordings, and stimulated recall interviews, researchers could examine how learners negotiate AI-generated suggestions and how initiative and authority are distributed within the group.

Such studies could investigate whether learners treat AI as an authoritative participant, a supportive resource, or simply another source of ideas to be evaluated collaboratively. Researchers might analyse patterns such as who introduces proposals, how AI contributions are accepted or challenged, and whether AI participation alters opportunities for quieter learners to contribute. The presence of AI may redistribute participation in ways that either support or constrain learners' ability to exercise agency within the group.

In addition to interactional dynamics, research could also examine relationships between patterns of shared autonomy and learning outcomes, including the quality of collaborative products, communicative effectiveness, and learners' perceived sense of ownership and contribution. Such work would contribute to a more socially situated understanding of hybrid autonomy by examining how agency is negotiated not only between learners and AI systems, but also across human–AI learning collectives.

Designing AI Tutors to Scaffold Autonomy

A further research direction concerns how AI systems themselves might be designed to support the development of learner autonomy rather than fostering dependency on automated assistance. One promising avenue for research would involve the design and evaluation of AI tutors that gradually reduce support as learners develop greater competence and confidence. Drawing on principles of scaffolding and adaptive support, such systems could initially provide detailed guidance, prompts, or corrective feedback, while progressively encouraging learners to assume greater responsibility for planning, monitoring, and revising their own work.

This line of research would lend itself particularly well to design-based methodologies. Researchers could develop and iteratively refine AI-supported learning environments for skills such as writing or conversation, comparing adaptive “fading support” systems with more consistently directive AI tutors. Data collection might include interaction logs, learner reflections, performance measures, and indicators of self-regulation, such as the extent to which learners attempt tasks independently before seeking assistance.

Such studies could help determine whether AI systems can be designed not merely to optimise task completion, but to cultivate greater learner agency over time. They may also provide insight into how learners respond affectively to the gradual withdrawal of support, including whether reduced guidance strengthens confidence and self-reliance or instead generates frustration and disengagement. More broadly, this work would contribute to understanding how hybrid autonomy can be intentionally scaffolded through the pedagogical design of AI-mediated learning environments.

Learning Analytics for Autonomous Learning Behaviors

further research opportunities lie at the intersection of learning analytics, AI, and learner autonomy. As increasing amounts of language learning activity take place within digital and AI-mediated environments, interaction data can provide valuable insight into how learners regulate their learning processes, engage with feedback, and distribute cognitive effort between themselves and intelligent systems.

One possible line of inquiry would involve developing analytics systems capable of identifying patterns associated with autonomous or dependent learning behaviours within AI-supported language learning platforms. In an AI-assisted writing environment, for example, the system might track behaviours such as the timing and frequency of AI assistance requests, the extent of self-correction prior to consulting AI feedback, revision patterns, time allocation across planning and drafting, or the degree to which learners modify AI-generated suggestions.

These behavioural traces could then be used to generate formative feedback aimed at supporting greater learner awareness and self-regulation. Learners might receive reflective prompts or visualisations encouraging them to evaluate their patterns of AI use, reconsider premature reliance on automated support, or engage more critically with machine-generated feedback. Comparative studies could investigate whether learners who receive such analytics-informed feedback demonstrate greater development in self-regulatory behaviours, critical engagement,

or independent problem-solving than learners using the same platform without reflective support mechanisms.

This line of research would also contribute methodologically to the study of hybrid autonomy by moving beyond reliance on self-report measures alone. Combining log data, self-regulation instruments, reflective accounts, and performance outcomes could provide a more fine-grained understanding of how autonomous learning behaviours emerge, shift, and become visible within AI-mediated learning environments. Such work may be particularly valuable in identifying learners who are becoming overly dependent on automated assistance and in designing interventions that encourage more reflective and agentic forms of AI use.

Learner Identity and Voice in AI-assisted Production

An important research direction concerns how AI-assisted language production influences learners' sense of authorship, identity, and personal voice in the target language. As learners increasingly collaborate with AI systems during writing and communication tasks, questions arise about how they negotiate ownership of language, stylistic choices, and authenticity within AI-mediated interaction.

Qualitative and mixed-methods studies could examine how learners engage with AI-generated suggestions during writing, storytelling, or other extended production tasks. Data sources might include successive drafts, AI-generated revisions, interaction histories, reflective journals, interviews, and textual analyses of learner output over time. Such research could investigate when learners accept, adapt, or reject AI-generated language and how they perceive the relationship between machine-generated suggestions and their own intended voice or identity.

Particular attention could be paid to learners' perceptions of ownership and authenticity. Some learners may experience AI support as expanding their expressive capacity by exposing them to alternative phrasing, stylistic variation, or more sophisticated linguistic resources. Others may perceive AI-generated language as diminishing the personal quality of their communication or encouraging increasingly standardised forms of expression. Previous research suggests that learners often remain concerned with preserving their own agency and voice even when integrating AI tools into language production (Alm, 2024).

This line of research could also explore how AI-mediated production shapes learners' confidence and identity as language users. For example, AI support may increase learners' willingness to express complex ideas while simultaneously creating uncertainty about the extent to which the final product reflects their own competence. Combining discourse analysis with reflective and affective measures could therefore provide important insight into how hybrid autonomy intersects with learner identity, authorship, and self-efficacy in AI-mediated language learning environments.

Theorizing “Hybrid Autonomy”

Alongside empirical work, further conceptual development is needed to define hybrid autonomy with greater precision and to distinguish it from related constructs such as self-regulated learning, distributed agency, AI literacy, and hybrid intelligence. A theoretical or model-building study could synthesize emerging empirical findings with work in learner autonomy, human–computer interaction, distributed cognition, sociomaterial theory, and ethics to clarify how autonomy is enacted when learners work with intelligent systems.

Such work would need to examine how control, choice, responsibility, and reflection are distributed across learners and AI systems. Key questions include how learners delegate particular functions to AI, how they remain aware of algorithmic influence, and how they decide when

to accept, modify, resist, or reject AI support. The aim would not be to attribute human-like agency to AI, but to account for how AI systems participate materially and interactionally in shaping the conditions under which learner agency is exercised.

A framework of hybrid autonomy could identify several interrelated dimensions. These might include cognitive capacities, such as critical evaluation of AI output; affective dispositions, such as confidence to challenge machine-generated suggestions and tolerate uncertainty; social competencies, such as negotiating AI use with peers and teachers; and technological proficiencies, such as understanding how AI systems structure options, feedback, and recommendations. It could also include ethical awareness, including the learner's capacity to decide when not to use AI or when delegation would undermine learning goals.

By formalising hybrid autonomy in this way, theoretical work would provide a shared vocabulary for future research and pedagogy. It would also help clarify what should be measured, supported, and protected in AI-mediated language learning environments where autonomy is no longer simply individual or self-directed, but distributed, negotiated, and technologically mediated.

Measuring Autonomy in AI-mediated Learning

A final methodological challenge concerns how learner autonomy can be measured in AI-mediated language learning environments. Existing measures of autonomy, including self-report questionnaires, observations, and strategy inventories, were largely developed for contexts in which learners remained the primary locus of cognitive and regulatory activity. Such measures may not adequately capture forms of autonomy that involve delegation, collaboration, and negotiation with intelligent systems.

An important research direction therefore involves developing and validating instruments capable of operationalising hybrid autonomy in observable and measurable ways. Potential indicators might include how learners configure and control AI tools, the extent to which they critically evaluate AI-generated suggestions, the diversity and sophistication of their AI use, and their ability to continue learning effectively without automated support. Rather than treating AI reliance itself as evidence of diminished autonomy, such work would need to distinguish between passive dependence and strategic, reflective delegation.

This research would likely require multi-method approaches combining self-report measures, performance-based tasks, discourse analysis, and learning analytics. Situational judgement tasks could be used to examine how learners respond to scenarios involving AI-generated errors, conflicting feedback, or ambiguous suggestions. At the same time, interaction data from AI-mediated platforms could provide behavioural indicators of autonomy, such as revision patterns, timing of AI consultation, or changes in the complexity of learner prompts over time.

Validation studies could then examine relationships between these new measures and related constructs such as self-regulation, metacognitive awareness, critical AI literacy, and teacher evaluations of learner independence. Such work would contribute not only to methodological development but also to conceptual clarification by helping identify which dimensions of autonomy remain most important in contexts where cognitive and evaluative processes are increasingly distributed across learners and intelligent systems.

Taken together, these research directions suggest that autonomy in AI-mediated language learning can no longer be understood as a purely individual capacity. Instead, autonomy emerges as a distributed, negotiated, and context-dependent process shaped by interactions between learners, teachers, peers, institutions, and intelligent systems. Advancing research across cognitive, affective, social, technological, and methodological dimensions will therefore

be essential for understanding how hybrid autonomy develops and how it can be supported in increasingly AI-rich language learning environments.

Conclusion: Autonomy in Transition

The emergence of artificial intelligence has brought autonomy research to a new turning point. For more than forty years, autonomy has served as one of language education's most enduring ideals, reflecting humanistic traditions that place responsibility, choice, and reflection at the centre of learning. The recent incorporation of generative, adaptive, and predictive technologies into classrooms and informal learning spaces has not replaced these ideals but rather transformed the conditions under which they are realised. The concept of hybrid autonomy proposed in this paper captures this transformation: a form of agency that is negotiated, shared, and mediated through increasingly intelligent tools.

The research reviewed here suggests that autonomy is not disappearing in the age of AI. But it is being redistributed. Learners now exercise control by managing relationships with systems that can anticipate their needs, provide feedback, and even generate language on their behalf. This redistribution brings both opportunity and risk. It allows unprecedented access to feedback, input, and interaction, yet it can erode reflection and deep engagement where learners and teachers do not retain interpretive authority. The implications extend beyond individual learner behaviour. Teachers, institutions, and technology designers all play important roles in shaping the conditions under which hybrid autonomy develops. Supporting autonomy in AI-mediated language learning may therefore require new forms of pedagogical mediation, critical AI literacy, assessment practices, and technological design that prioritise reflection, transparency, and learner agency rather than efficiency alone. Equally important is the need to recognise that autonomy is shaped by broader social and political conditions, including inequalities in access, linguistic representation, and the distribution of technological power.

Several trends are likely to shape the next phase of this research. First, the boundary between formal and informal learning will continue to blur as learners adopt personal AI assistants that accompany them across settings and languages (Lai & Sundqvist, 2025). Understanding how these tools influence autonomy over months or years will require longitudinal, ecological approaches. Second, the development of autonomy-supportive AI design, or interfaces that disclose reasoning, allow users to modify parameters, and prompt reflection, will become central to both applied linguistics and educational technology. Third, teacher education will increasingly focus on AI literacy and professional autonomy, ensuring that teachers can mediate rather than merely manage intelligent systems. Finally, ethical and epistemic questions about authorship, bias, and accountability will remain inseparable from autonomy research, as learners navigate what it means to learn responsibly with machines that share in meaning-making.

Autonomy has always been about more than independence; it is about the capacity to act critically and creatively in the face of constraints; to find space in rigid situations and systems. As those systems become synthetic, the goal of language education must be to ensure that human learners remain active partners in their own learning futures. The coming decade will test our ability to extend the tradition of autonomy into an age where intelligence itself is hybrid and represents a shared enterprise between human and artificial minds.

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