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RESEARCH ARTICLE

GenAI and language learning motivation: Fundamental questions and a research agenda

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Abstract

Generative artificial intelligence (GenAI) is rapidly transforming education, including the ways students learn languages and experience motivation. While recent research has focused mainly on the affordances of GenAI, much less attention has been given to its potential risks for learners' motivation and engagement. This paper addresses this gap by examining how GenAI may both enhance and undermine language learning motivation. We discuss how GenAI can affect the satisfaction or frustration of the three basic psychological needs – autonomy, competence, and relatedness – and how these effects may shift motivational orientations from intrinsic to extrinsic forms. We then explore how GenAI might reduce cognitive engagement, critical thinking, and assessment integrity when used uncritically. We also consider key methodological opportunities and challenges in researching GenAI-mediated language learning motivation. Based on this analysis, we identify key directions for future research agendas, including the balance between autonomy and dependence, sustaining motivation beyond novelty effects, rehumanizing digital learning, and redefining teachers' roles in GenAI-rich contexts. We also call for theoretical renewal, ethical awareness, and methodological innovation in the study of GenAI-mediated motivation. A deeper understanding of these processes will allow future research and practice to harness GenAI's potential responsibly, promoting motivation that is both sustainable and self-determined.

الملخص

يشهد التعليم تحوّلاً جذريًا بفعل الذكاء الاصطناعي التوليدي، بما في ذلك الطرق التي يتعلم بها الطلبة اللغات ويشعرون من خلالها بالدافعية. ورغم أن البحوث الحديثة ركّزت في الغالب على الإمكانات والفرص التي يوفّرها الذكاء الاصطناعي التوليدي، فإن الاهتمام بمخاطره المحتملة على دافعية المتعلمين وانخراطهم لا يزال محدودًا. تسعى هذه الورقة إلى سدّ هذه الفجوة من خلال دراسة كيف يمكن للذكاء الاصطناعي التوليدي أن يعزّز أو يقوّض دافعية تعلم اللغة. نناقش في هذا السياق كيف يمكن للذكاء الاصطناعي التوليدي أن يؤثر في إشباع أو إحباط الحاجات النفسية الأساسية الثلاث- الاستقلالية، والكفاءة، والعلاقات الاجتماعية- وكيف يمكن أن تؤدي هذه التأثيرات إلى انتقال أنماط الدافعية من داخلية إلى خارجية. ثم نستكشف كيف يمكن يؤدي الاستخدام غير النقدي للذكاء الاصطناعي التوليدي إلى تقليل المشاركة المعرفية والتفكير النقدي ونزاهة التقييم الأكاديمي. كما نتناول الفرص والتحديات المنهجية الأساسية المرتبطة ببحث دافعية تعلم اللغات في بيئات قائمة على الذكاء الاصطناعي التوليدي. وبناءً على

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هذا التحليل، نحدّد اتجاهات رئيسية للبحوث المستقبلية على مستوى البرامج البحثية، تشمل تحقيق التوازن بين الاستقلالية والاعتماد، واستدامة الدافعية بعد زوال أثر الجِدّة، وإعادة الطابع الإنساني للتعلّم الرقمي، وإعادة تعريف دور المعلّم في البيئات المعززة بالذكاء الاصطناعي التوليدي. كما ندعو إلى تجديد نظري، ووعي أخلاقي، وابتكار منهجي في دراسة الدافعية بوساطة الذكاء الاصطناعي التوليدي. إن فهمًا أعمق لهذه العمليات سيسمح للبحوث والممارسات المستقبلية بالاستفادة من إمكانات الذكاء الاصطناعي التوليدي بمسؤولية، وتعزيز دافعية تكون مستدامة وذاتية التحديد في آنٍ واحد.

摘要
生成式人工智能 (GenAI) 正深刻变革教育领域 包括学生的语言学习方式与动机体验。近期研究虽多聚焦于 GenAI 的技术可供性 (affordances). 但针对 GenAI 对学习者动机和投入构成的潜在风险讨论尚不充分。本文旨在填补此项空缺. 系统考察 GenAI 对语言学习动机增强和损害的双重作用。我们讨论 GenAI 如何影响自主性、胜任感与归属感这三项基本心理需求的满足 并揭示这些影响如何导致动机类型由内在向外在的转变。我们也探索不加批判地使用 GenAI 对学习者的认知投入、批判性思维及测试诚信的负面影响。我们还列举了 GenAI 中介的语言学习动机研究中面临的重要方法机遇与挑战。基于上述分析 我们提出未来研究的若干关键方向: 如何在自主与依赖间寻求平衡; 如何超越新奇效应 培养学习者持久的学习动机; 如何回归数字化学习的人本主义; 以及如何在 GenAI 深度融合的教育生态中重新定义教师角色。我们呼吁动机研究应致力于理论更新、伦理反思与方法创新。对这些过程的深入理解 将使未来的研究和实践能负责任地释放GenAI的潜能 以培养可持续的、自我决定的学习动机

Keywords: motivational justice; disengagement; academic integrity; teacher mediation; teacher development

الكلمات المفتاحية: العدالة الدافعية؛ التراجع في الانخراط؛ النزاهة الأكاديمية؛ وساطة المعلّم؛ تطوير المعلّم

关键词: 动机正义; 学习疏离; 学术诚信; 教师中介作用; 教师发展

Introduction

If recent headlines are any indication, the arrival of generative artificial intelligence (GenAI) in education has triggered both fascination and panic in equal measure. "AI is revolutionizing education 4.0," declared an article on the World Economic Forum (Milberg, 2024), while the World Bank (2025) celebrated this "revolution in education." Elsewhere, alarm bells are ringing, however. *New York Post* warned that "AI shortcuts are already making kids lazy" (Schlott, 2025) while *The Guardian* lamented that "Students are cheating en masse … all the while making ourselves stupider" (McDowell, 2025). One headline in *The Atlantic* went so far as to proclaim that "The college essay is dead" (Marche, 2022). Another from *The Scottish Sun* offered a darker prophecy: "We may be creating a generation of morons" (Musson, 2025). The message is clear: GenAI has become education's newest hero and its most feared villain.

While such headlines capture the drama of a technological revolution, they may also flatten a far more complex reality. Public narratives about AI in education tend to frame it in terms of its visible outcomes – efficiency, performance, or decline – rather than the underlying human processes influencing how students engage with learning. What

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these accounts often overlook is the psychological dimension: how learners actually *experience* this transformation. The arrival of GenAI in classrooms is not only changing what students can do but also how they feel about learning itself – what drives them, sustains them, or, in some cases, discourages them. This motivation determines not only whether students engage with GenAI tools but also the quality of that engagement: whether it is self-driven, sustained, and personally meaningful, or merely instrumental and short-lived. From this perspective, motivation becomes an important lens through which to understand the educational consequences of GenAI. Technological innovations have always influenced how people learn, but few have the potential to reshape the very reasons *why* they learn.

This paper aims to move beyond the prevailing dichotomies in public discourse (i.e. a tool for educational transformation versus a source of cognitive decline and academic dishonesty) and toward a more systematic understanding of how GenAI intersects with learner motivation. We examine both the promises and perils of GenAI for students' motivation to learn a second language (L2). The discussion first introduces the core principles of motivation and explains why they are central to understanding the human side of GenAI integration. It then outlines potential motivational risks, methodological opportunities, and challenges, before presenting a set of broader research directions for the field. The goal is not to take a position for or against GenAI, but to articulate the psychological questions that must be addressed if GenAI is to enhance, rather than erode, high-quality learning motivation (Lodge & Loble, 2026).

What is language learning motivation?

Self-determination theory (SDT; Ryan & Deci, 2017) has become one of the most influential theories of human motivation and is now widely applied in various fields such as education, health, sports, and organizational psychology. While a number of theoretical frameworks have been proposed to understand language learning motivation, SDT offers a particularly useful lens for the present discussion because of its focus on the quality of motivation and the role of basic psychological needs. At its core, SDT emphasizes that people are not passive recipients of reinforcement but active organisms with innate tendencies toward learning, growth, and integration. The historical roots of the theory date back to Edward L. Deci's early experiments in the 1970s, which showed that providing monetary rewards for puzzle solving could undermine participants' intrinsic interest in the task (e.g. Deci, 1971). These findings challenged the prevailing behaviorist view, which assumed that external reinforcement was always effective in strengthening desired behaviors. In the 1980s, Deci and Ryan further developed these insights into a comprehensive framework of motivation, focusing on the psychological conditions that either facilitate or hinder autonomous functioning (Deci & Ryan, 1985). The central assumption of SDT is that human beings have basic psychological needs, and that the satisfaction or frustration of these needs largely determines the quality of their motivation. Over the past four decades, a large body of empirical research has provided strong support for SDT, establishing it as one of the most robust theoretical perspectives in motivational psychology (Vansteenkiste et al., 2020). For education, this framework is particularly relevant because it explains not only

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how much motivation students have but also what kind of motivation, and how this influences the depth, persistence, and quality of learning.

A cornerstone of SDT is the idea that all individuals share three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2017). Autonomy refers to the experience of volition and choice, the sense that one's actions are self-endorsed rather than externally controlled. Competence is the feeling of effectiveness and mastery when facing optimal challenges, supported by constructive feedback and opportunities for growth. Relatedness involves a sense of belonging and connection to others, including peers, teachers, and the broader community. Research across cultures shows that the satisfaction of these needs is associated with higher levels of well-being, persistence, and academic achievement, while their frustration is linked to disengagement, anxiety, and poorer outcomes (Cerasoli et al., 2016; Vansteenkiste et al., 2020).

Building on these needs, SDT proposes a continuum of motivation ranging from complete lack of motivation (amotivation) to intrinsic motivation. Between these extremes are different forms of extrinsic motivation that vary in the degree to which they have been internalized by the learner. At the controlled end are external regulation, where behavior is driven by external rewards or punishments, and introjected regulation, where actions are pressured by guilt, shame, or the desire to protect self-worth. More autonomous forms are identified regulation, where a learner recognizes and accepts the value of an activity, and integrated regulation, where the activity is fully aligned with the learner's sense of self. Finally, intrinsic motivation reflects engagement in an activity for the inherent enjoyment and satisfaction it provides (Ryan & Deci, 2017).

A central insight of SDT is that not all extrinsic motivations are equally detrimental. When extrinsic goals are internalized and integrated, they can support persistence and achievement almost as effectively as intrinsic motivation. What matters most is the relative balance between autonomous and controlled motivation. For example, a student studying a language purely to avoid punishment is less likely to achieve deep understanding than one who sees its value for future aspirations, even if not studying purely out of enjoyment. Satisfaction of the three psychological needs is the mechanism that facilitates this internalization process, moving learners from controlled toward more autonomous motivation (Al-Hoorie et al., 2025).

The principles of SDT have been widely applied in education and language learning, with evidence showing that autonomy-supportive teaching practices foster deeper learning and more positive student outcomes (Joe et al., 2017). Autonomy support includes strategies such as providing meaningful rationales, offering choices that are not overwhelming, acknowledging students' perspectives and feelings, and avoiding excessive reliance on grades, deadlines, or threats. When teachers adopt such practices, students typically show greater interest, more persistence, and higher academic performance (Su & Reeve, 2011). By contrast, controlling environments, where students feel pressured to behave in particular ways, are associated with anxiety, surface learning, and even dropout. Competence can be supported through structured guidance, timely feedback, and tasks that are optimally challenging. Relatedness is enhanced when teachers and peers create a classroom climate of trust, respect, and collaboration (Niemiec & Ryan, 2009).

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These ideas are increasingly relevant in digital and GenAI-mediated learning environments. In this paper, we draw on SDT specifically because its focus on basic psychological needs and the quality of motivation allows us to examine not only whether AI supports learning, but how it interacts with the underlying reasons for learning. SDT explains motivation in terms of the satisfaction of basic psychological needs and the movement along a continuum from controlled to autonomous regulation. Its contribution is not only to measure the amount of motivation students have but to distinguish the quality of that motivation and its consequences for engagement, persistence, and well-being. SDT, therefore, may provide a useful lens for evaluating GenAI in language learning. Technological innovation is not automatically motivationally beneficial. Instead, its design and use must be guided by an awareness of how it affects learners' psychological needs. In this way, SDT connects traditional motivational theory to contemporary debates about GenAI, digital tools, and the future of learning. It gives us conceptual tools to evaluate whether these innovations are helping to cultivate high-quality, autonomous motivation, or whether they risk undermining it. This makes SDT a vital foundation for the broader discussion in this paper, especially as we turn to the potential positive and negative effects of GenAI on learners' motivation and engagement.

A research agenda for language learning motivation in the GenAI age

How does GenAI support language learning motivation?

The use of GenAI provides important affordances for many processes of learning (García-Martínez et al., 2023; Kasneci et al., 2023). In this paper, we use the term GenAI to refer broadly to data-driven computational systems that can perform tasks typically requiring human intelligence (e.g. language processing, prediction, and adaptation) and can produce human-like text and interact with users in real time. In language learning, evidence suggests that GenAI use offers similar support by helping learners bridge gaps in input, interaction, and feedback and provides personalized, interactive, data-rich experiences that traditional classroom instruction and teacher-led learning experiences often cannot match (Chapelle, 2025; Kohnke et al., 2023; Yang & Li, 2024).

However, the specific ways and means through which GenAI benefits and supports language learners' motivation are still an underexplored topic (Han, 2024). Because many of its characteristics change how learners expend effort, gain feedback, and experience success, GenAI has the potential to reshape the motivational dynamics of language learning. In this section, we frame the affordances of GenAI and their motivational impacts from SDT's mini-theories (Al-Hoorie et al., 2024; see Table 1). In essence, GenAI can be seen not merely as a technological aid in language learning but also as a motivational one. As our description here shows, GenAI tools have potential to impact how external feedback is framed (Cognitive Evaluation Theory), how motivation is internalized (Organismic Integration Theory), how different learner orientations are supported (Basic Psychological Needs Theory, Causality Orientations Theory), what types of goals are fostered (Goal Contents Theory), and how relationships are simulated or scaffolded (Relationships Motivation Theory) (see Table 1). Below, we outline a few of these links.

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Table 1. The motivational impact of GenAI from SDT's six mini-theories

SDT mini-theory	Motivational principle	AI affordance	L2 motivational impact
Basic Psychological Needs Theory	Motivation is fostered when learners' needs for autonomy, competence, and relatedness are supported.	Personalized learning choices; adaptive feedback; conversational GenAI	AI use may satisfy learners' core psychological needs, leading to stronger, more self-determined motivation.
Cognitive Evaluation Theory	Feedback, rewards, and external input and events affect learners' intrinsic motivation.	Real-time, supportive feedback; gamified elements of learning	AI use may build learners' competence and sustain interest without undermining their intrinsic motivation.
Organismic Integration Theory	Motivation exists on a spectrum from fully controlled to fully autonomous orientation.	Personalized pathways for learning; connections to personal relevance and learner goals	AI use may enable learners to internalize reasons for learning, moving from external → internalized → intrinsic motivation.
Causality Orientations Theory	Learners differ in how they approach learning situations, adopting either autonomy-, control-, or impersonal orientations.	Flexible tools and choices for exploration; structured and planned tasks and directions	AI support can be matched to learners' orientation, optimizing their motivation and preventing disengagement.
Goal Contents Theory	Intrinsic goals (growth, learning) are more sustaining than extrinsic (status, performance, rewards).	Authentic self-expression; collaborative content; connection to real-world utility and creativity	AI use may harness the drive of intrinsic goals while also balancing extrinsic motivators.
Relationships Motivation Theory	Motivation is strengthened by relationships of mutual care and belonging.	Safe practice partners (chatbots); low-pressure environment; simulated language use community; GenAI-supported group progress	AI use may foster belonging, lower anxiety, and encourage engagement in imagined or real communities of L2 use.

One of the clearest ways GenAI impacts language learners' motivation is by personalizing opportunities for input and interaction. For example, the ability to interact with GenAI across a choice of academic, professional, or informal registers and modes of communication can support more meaningful, self-directed exploration of the language (Chiu et al., 2024), as GenAI provides models of input and positive evidence for different patterns and uses of the target language. Learner agency and autonomy are enhanced through tools that enable learners to practice independently at their own pace, choosing when, how, and what to focus on, building a sense of ownership of the learning process and confidence outside formal classrooms. GenAI tools that adapt to learner goals, expressed through user prompts, may make the process feel personally relevant and support active and self-regulated learning (Lin & Chang, 2023). Over time, learners may integrate these various schemas for input and interaction into their

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broader sense of self as a language user, moving closer to internalized forms of motivation (Du & Alm, 2024). Intriguing questions remain about the benefits of adaptive input, in which GenAI models adjust their own difficulty, pacing, and content based on the learner's proficiency, strengths, and gaps to allow for tailored and scaffolded learning. However, this adaptability suggests that GenAI tools can effectively cater to learners with different motivational profiles (Jeon, 2024), including those who are intrinsically motivated as well as those driven by extrinsic goals, and those who vary in their needs for autonomy, competence, and relatedness.

AI also incorporates opportunities for scaffolded interaction and negotiation of meaning and can simplify or elaborate its use of language based on comprehension checks. The practically unlimited practice partner of chatbots and conversation agents offers simulated but seemingly authentic and low-pressure interaction opportunities (Liu & Reinders, 2025). These allow learners to explore different voices, registers, and roles in the target language, establishing a sense of connection to the target language community and building confidence in themselves as competent language users (Bear et al., 2024). By design, GenAI relies on ongoing assessment of the user's prompts and can provide real-time, individualized feedback focused on their spoken or written language use to suggest revisions. This continuous, targeted monitoring or constant feedback loop can help learners see progress over time and guide their metacognitive awareness (Han & Li, 2024; Quan, 2025). The instant responses that are a default part of GenAI tools help learners feel supported in taking risks without the anxiety of making mistakes in front of others and can empower learners to tackle content and language that would otherwise seem out of reach. As it adjusts feedback levels to the learner's level, GenAI has the potential to avoid inducing frustration from learning tasks that are too challenging and boredom from tasks that are too easy (Fryer et al., 2017).

Another prominent characteristic of GenAI is its compatibility with gamified instructional design for language learning (Yuan & Liu, 2025). Gamification has gained momentum as a way of captivating the interest and attention of students and enhancing their motivation to actively participate in the educational experience (Oliveira et al., 2025; Zeybek & Saygı, 2024). The use of gamified elements such as competitions, rewards, streaks, badges, and leaderboards/rankings can be motivating, though, as discussed more later, such GenAI-driven systems need to be designed carefully, as an overemphasis on extrinsic rewards risks undermining language learners' intrinsic motivation (Shortt et al., 2023; Zhai et al., 2024). GenAI systems also tend to be constructed with specific contingencies and pathways in mind (i.e. how GenAI is engineered to respond to certain requests and prompts) that can recommend next steps, resources, or practice tasks that align with learners' goals. GenAI that enables goal tracking can help learners set, monitor, and reflect on progress toward specific outcomes (Du et al., 2021). Furthermore, the deliberate extension of such immersive experiences to generate GenAI-mediated collaboration (e.g. group dashboards, shared progress tracking) can function as an antidote to language learning being a solitary and individual experience. GenAI that simulates learner participation in broader L2-speaking communities may foster a sense of belonging in a learning group, strengthening relational motivation (Tai & Chen, 2024).

As we described above, GenAI is helping to reduce common barriers to language learning not only by providing the necessary components for language development

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but by directly tapping into the psychological drivers of motivation. However, it is also fairly straightforward to identify where gaps in the field's knowledge are and what kinds of evidence are missing (Fryer et al., 2020; Pegrum, 2025).

First, with regard to adaptive input and personalization, more research is needed on how different levels of GenAI adaptation (complexity of input, pacing of chatbots' language use, variations in register) influence sustained motivation. Some learners may thrive on tailored scaffolding, while others risk becoming dependent on the GenAI system and the personalization it provides rather than building self-regulated strategies. Longitudinal studies are, therefore, needed to explore whether the ease of use that accompanies this type of personalization promotes autonomy or fosters unintentional dependence on technology.

Related to learners' agency and autonomy in GenAI use, additional research is needed to investigate how GenAI-enabled choice and control over these models (e.g. large language models and AI-driven tutoring systems) translate into learners' authentic agency and ownership of the learning process. Although GenAI tools provide learners with flexible choices around topics, modes, and styles of interaction, excessive choice and endless flexibility can sometimes have a debilitating effect on learners' behavior. Further investigation will help clarify whether and how GenAI-mediated scaffolding and its choice architecture strengthen or diminish learners' sense of competence and self-direction.

Turning to the real-time feedback users receive from GenAI models, empirical studies are needed to better understand how instant, individualized GenAI feedback affects the conative dimensions of learning and shapes learners' confidence, anxiety, and willingness to take risks in language use. For instance, it remains an open question whether the feedback loops that result from engaging with GenAI-supported learners to step out of their comfort zone as language users or foster overreliance on positive reinforcement and surface-level performance to please the system.

With regard to gamification elements of GenAI and learners' motivational orientation to learning, the sustained motivational effects of gamified GenAI systems remain underexplored (Al-Hoorie & Albijadi, 2025). While badges, streaks, and leaderboards may initially boost learners' engagement, this may result from externally imposed goals. Studies are needed to determine how to balance extrinsic rewards and intrinsic goal development, as well as the trade-off between the two, such as whether learners internalize language-learning goals or lose interest once external rewards diminish.

Similarly, little is known about the long-term sustainability of GenAI use for learners' motivation. The initial novelty effects of GenAI use may boost motivation and engagement, but evidence is lacking on whether and how learners' motivation may persist over time (Liu et al., 2025). Research is needed to examine whether GenAI sustains motivation beyond such immediate short-term effects, for example, by tracking whether GenAI supports the conditions for more enduring forms of motivation and how it contributes to personal learning trajectories over time.

The relational and social dimensions of language learning motivation are equally important, and further exploration is needed on the role of GenAI in simulating communities of practice and fostering belonging. One intriguing way to explore how GenAI-mediated interaction builds relational motivation is to take a comparative

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approach that examines motivational outcomes from GenAI-mediated interaction versus more conventional human collaboration (e.g. whether L2 interaction with conversational agents fosters the same sense of belonging and community as engaging with real peers in collaborative L2 tasks).

Given the diverse populations learning languages, the range of purposes for learning, and the various use cases for GenAI, key questions remain about how GenAI impacts motivation for these different learner profiles (e.g. age groups, cultural backgrounds, proficiency levels). Studies are needed to examine the unique effects of GenAI use in different populations and contexts of language learning (e.g. whether young learners driven by play respond differently to gamified practice than heritage learners motivated by identity affirmation) to better understand how GenAI helps bridge motivational inequities or exacerbates them.

Language teachers will undoubtedly remain relevant for language learning in many contexts (Lai & Sundqvist, 2025), and the ways in which they engage with GenAI tools to enhance their instruction deserve further research. The teacher's role in GenAI-supported language learning and how their mediation (e.g. when an instructor frames GenAI as a resource for experimentation and growth) shapes learners' motivational outcomes is still poorly understood. More evidence is also needed on how teacher preparation or continuing education, classroom integration practices, and institutional policies on GenAI use influence learners' motivational outcomes.

Finally, as with most research that attempts to understand and intervene in human volitional processes and behaviors, there are multiple ethical considerations. Since GenAI is often hailed as an equitable solution to many existing challenges in under-resourced language learning settings, empirical work is needed to examine how unequal access to GenAI tools affects motivational opportunities across contexts. For example, do learners with access to advanced and expensive GenAI tools experience higher quality motivation than peers using limited or no GenAI tools? There is also the question of how inherently equitable GenAI systems are, and future research should address how bias in GenAI systems (e.g. unrepresentative training data, flaws in algorithmic design) affects motivational opportunities for learners from marginalized groups.

How does GenAI undermine language learning motivation?

The potential "dark side" of GenAI for learners has so far received relatively limited attention compared to its celebrated opportunities. Most existing discussions in the literature focus on the benefits of GenAI, often driven by novelty effects and rapid technological advances (Cotton et al., 2024; Zawacki-Richter et al., 2019). When possible drawbacks *are* acknowledged, the emphasis is usually placed on teachers, especially concerns about workload and job security, rather than on students. However, as GenAI systems become integrated into everyday learning, it is increasingly clear that students' motivational dynamics and, consequently, their study habits are also likely to be reshaped in profound ways. These changes may not always be positive. An important direction for future research is, therefore, to understand these risks and identify how GenAI can enhance, rather than undermine, high-quality learning motivation and engagement.

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A major concern relates to how GenAI systems may change the balance between intrinsic and extrinsic motivation. Learning has long been valued not only for specific outcomes but also for the curiosity and personal interest that drive students to engage deeply with knowledge. However, many GenAI-driven platforms are designed around efficiency and quick results. Students may come to value speed, convenience, or simply the ability to get an answer, rather than the process of exploration (Zhai et al., 2024). As mentioned above, this tendency can be reinforced by the use of extrinsic incentives such as points, badges, or streaks, which are now common in digital learning environments. Although such incentives can temporarily increase engagement, research has shown that extrinsic rewards often undermine curiosity-driven forms of learning, a process known as the "crowding out" of intrinsic motivation (Al-Hoorie, 2024; Ryan & Deci, 2017). When learners begin to chase gamified external rewards rather than pursuing knowledge for its own sake, their engagement may become more superficial, less persistent, and more dependent on external structures (Hanus & Fox, 2015; López-Navarro et al., 2023). This raises important questions for the design of GenAI tools in education: How can students benefit from GenAI-enhanced gamified features without displacing the deeper, self-sustaining interest that supports lifelong learning?

A second concern is related to autonomy. One of the most central findings of motivational research is that students thrive when they feel ownership over their learning (Ryan & Deci, 2017). Yet GenAI systems increasingly use algorithmic nudging to steer students toward particular tasks, content, or strategies. On the surface, such personalization may appear supportive, since it promises to guide students toward what is most efficient or suitable for their level. Nevertheless, if these suggestions are too directive or opaque, they risk eroding the learner's sense of agency. Students (and their instructors) may begin to follow GenAI's cues automatically, rather than exercising choice or developing their own strategies. While this tendency is not unique to GenAI and can also occur in teacher-led contexts, GenAI systems may amplify it due to their immediacy, perceived authority, constant availability, and the inherent biases in these models. Over time, this can weaken self-regulation, as learners come to depend on GenAI to tell them what to do next (Fan et al., 2025). In addition, algorithmic nudges are not always neutral: They may reflect design choices, commercial priorities, or hidden biases. This makes it even more important to ask whether autonomy is being genuinely supported or quietly undermined. Preserving learner agency requires transparency, the possibility to override suggestions, and a design philosophy that respects students as active decision-makers.

Relatedness may also be undermined by the pervasive adoption of GenAI. Human motivation does not develop in isolation; it is deeply connected to feelings of belonging, recognition, and authentic social interaction (Cerasoli et al., 2016; Ryan & Deci, 2017). GenAI tutors, chatbots, and virtual companions may simulate conversation and even provide empathetic responses. While these features can make learning feel more engaging, they may also reduce opportunities for genuine connection with peers and teachers. If students begin to replace human interaction with machine-generated dialogue, the quality of relatedness may decline. This *social thinning* could have long-term effects, not only on motivation but also on the development of collaboration skills, empathy, and a sense of community. In cultures and contexts where learning has always been embedded in social practices, such a reduction in authentic relatedness may be

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especially harmful. Therefore, the challenge is not to reject GenAI assistance altogether but to design it in ways that strengthen, rather than replace, human connections in education.

Beyond the frustration of basic psychological needs, another area where GenAI may negatively affect learners' motivation is through their engagement. In this paper, we adopt a broad view of motivation that extends beyond learners' reported goals or intentions to include the *quality of their engagement* in learning activities. From this perspective, constructs such as cognitive engagement, critical thinking, higher-order thinking skills, problem-solving abilities, persistence and procrastination, and self-regulation are not separate from motivation but are key behavioral and cognitive manifestations of it (Hiver et al., 2021), including learners' willingness to critically evaluate information and question potential cultural or ideological biases in the content they encounter. When motivation is more autonomous and internally regulated, learners are more likely to invest effort, engage deeply with content, and persist in the face of difficulty. Conversely, when motivation is more controlled or externally driven, engagement may become superficial, strategic, or avoidant. The following discussion, therefore, treats changes in cognitive engagement and related processes as indicators of shifts in the quality of learners' motivation in AI-mediated environments.

Cognitive engagement refers to the extent to which students invest mental effort in activities such as problem solving, analysis, and evaluation (Hiver et al., 2021). A long tradition of research has shown that these deeper forms of engagement are vital for lasting learning and transfer of knowledge (Hiver et al., 2024). However, the introduction of GenAI systems that provide instant answers raises important concerns about whether students will continue to practice such skills or whether they may gradually decline. This is clearly illustrated in the potential reduction of critical thinking. Struggling productively with a problem, sometimes referred to as *desirable difficulty*, is often necessary for internalization and deeper understanding (Bjork & Bjork, 2020). When students instead rely on GenAI to deliver quick and polished responses, they bypass this cognitive struggle. While efficiency is gained in the short term, the risk is that learning becomes more superficial, with less durable outcomes (Stadler et al., 2024; Weidlich et al., 2025). In effect, GenAI can remove the very obstacles that encourage students to reorganize knowledge, reflect, and apply reasoning.

Another broader concern related to cognitive engagement is the utilization of higher-order thinking skills, problem-solving abilities, and independent judgment. If students come to see GenAI tools as the default way of answering questions, they may invest less in their own reasoning processes. Over time, this reliance could reduce the ability to analyze complex problems without external assistance. Research has shown that learners tend to prefer to use ChatGPT as a shortcut, leading to procrastination, memory loss, and lower academic performance (Abbas et al., 2024). Overreliance on GenAI can also affect critical literacy. Even though GenAI systems are clearly becoming more and more accurate in terms of factual correctness, they are less likely to be free from cultural or ideological biases. For instance, large language models are trained on data that is heavily drawn from Western, educated, industrialized, rich, and democratic contexts (Henrich et al., 2010). If students accept GenAI outputs uncritically, they may fail to question such hidden assumptions. This can impair their ability to recognize bias, assess evidence, and compare perspectives.

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This diminished cognitive engagement could lead to the possibility of *deskilling*. Skills that are not regularly practiced can deteriorate, especially those involving complex reasoning or higher-order literacy, due to complacency and automation bias (Parasuraman & Manzey, 2010). For example, if students consistently outsource tasks such as summarizing, paraphrasing, or evaluating arguments to GenAI tools, they may find that their own capacity to perform these tasks independently begins to weaken. Similarly, if answers are always a prompt away, students may lose the habit of persistence in the face of challenge. Instead of becoming active learners who seek, evaluate, and synthesize information, they may become consumers of ready-made solutions. Such passivity is linked to lower levels of engagement and agency, weaker knowledge retention, and reduced transfer of skills to new domains (Darvishi et al., 2024; Zhai et al., 2024).

The concerns discussed earlier are especially visible in the area of assessment integrity, which has become a common theme in news headlines and one of the most serious headaches for educators. Educators have, therefore, started to return to pen-and-paper examinations. This is not because they believe that such exams are the future of education, but rather because they see them as the only immediate way to control the risks of GenAI-assisted cheating, as the nature of academic dishonesty has changed. In the past, students who wanted to cheat often did so by colluding with classmates or by using contract-cheating services. Now, students can simply generate an assignment quickly and for free (Abbas et al., 2024; Cotton et al., 2024), making cheating much easier and less visible. Traditional plagiarism detection tools were never designed to identify GenAI-generated text, and the new GenAI detectors that have emerged remain far from reliable and lack the accuracy and transparency needed to be trusted in high-stakes assessment (though see linguistic fingerprinting; Kutbi et al., 2024).

From a motivational perspective, the growing tendency to cheat with the help of GenAI can be understood as a form of disengagement. In such cases, students are no longer focused on the process of learning itself but are mainly seeking external rewards such as grades or credentials, a classic example of the tail wagging the dog. If this is the case, then addressing the problem cannot be limited to new detection technologies or stricter control measures. It must also include an effort to understand and deal with the psychological roots of this disengagement. From this perspective, the recent interest in pen-and-paper examinations may not be entirely negative. Such exams can have a strong psychological effect, signaling seriousness and accountability, and making students feel that their individual effort really matters. At the same time, it would be a mistake to ignore the potential of GenAI as a learning tool. The challenge is to incorporate GenAI into courses in ways that encourage responsible use, rather than avoidance or concealment. One way forward is to include GenAI-related tasks while ensuring that the assessment still probes deep understanding. For example, a written assignment that has been supported by GenAI could be followed by an oral component, where the student is required to explain and defend the work in their own words. This balance could help to protect integrity while still preparing students for a GenAI-mediated world.

Looking forward, we expect a growing tension between teachers who try to preserve the "old ways" of learning and a younger generation of students who increasingly question the value of these approaches in a GenAI-mediated world. Some may argue that the loss of certain skills is not necessarily problematic. After all, most researchers

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today no longer perform statistical analyses by hand and are grateful for that (Van Dis et al., 2023). In the same way, it may be reasonable to reconsider which educational practices remain essential and which can be safely delegated to technology. However, the debate may go even further. With the availability of advanced GenAI translation and communication tools, some students and employers may begin to question the very value of learning a new language or making it a requirement for graduation or employment (Al-Hoorie & AlShakhori, 2025; Al-Hoorie et al., 2021). Such developments pose a serious challenge to the field of language education. Researchers can no longer take for granted that the value of L2 learning is self-evident. Instead, they must demonstrate its continuing value to the wider public, not only in terms of cognitive and professional benefits but also in terms of cultural understanding, identity, and global citizenship. If this case is not convincingly made, there is a real risk that L2 learning will be further marginalized in the era of GenAI.

How can we research GenAI-mediated language learning motivation?

Having outlined the affordances and risks that GenAI brings to language learning motivation, in this section, we consider how these issues can be investigated. Importantly, GenAI plays a dual role in this regard. First, GenAI-mediated learning environments serve as the context of the study, generating high-resolution behavioral data that allow researchers to study motivational processes with unprecedented granularity. Second, GenAI is increasingly used as a tool for research throughout the research pipeline. Both roles present significant methodological opportunities and challenges. We discuss each in turn.

Methodological opportunities

A primary methodological opportunity afforded by GenAI-mediated environments is access to forms of data that are either unavailable or too costly to acquire in conventional settings. Traditional motivation research has primarily relied on cross-sectional self-report surveys or interview-based case studies (Liu, 2024). These methods are limited by their reliance on participant recall, which can yield a coarse and sometimes imprecise representation of motivational dynamics. Similarly, conventional pre-post experimental designs are often insufficient for capturing critical developmental trajectories within the learning process. In contrast, GenAI-mediated platforms can produce *digital trace data*, high-resolution, unobtrusively collected records of user interactions within a digital environment (Grisold et al., 2024). These time-stamped traces of learner interactions with GenAI prompts, feedback systems, leaderboards, and conversational agents allow researchers to move beyond static snapshots of motivation (such as those captured by cross-sectional surveys) to more fine-grained processes of motivational dynamics.

The availability of rich digital trace data enables the application of learning analytics methods to examine motivational dynamics with greater precision and scale. Researchers can use computational methods such as *process mining, sequence analysis*, and *clustering* to identify recurring patterns in learner behavior (Grisold et al., 2024). These methods can translate time-stamped interaction data, such as clicks, mouse movements, time spent on tasks, and sequence of tool use, into meaningful patterns

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of learning engagement (Lämsä et al., 2025; Macke et al., 2024). For instance, Lämsä et al. (2025) used hidden Markov modeling to analyze the sequence of actions in an essay writing task and infer latent self-regulated learning processes that would be undetectable by traditional measures. Such analyses could help address the tension between learner agency and dependence on GenAI discussed above and reveal whether learners' behavioral sequences demonstrate increasing self-direction or a growing reliance on GenAI.

In addition to analyzing temporal sequences, methods from network science, such as *epistemic network analysis*, can visualize the complex network of connections in learners' interaction, cognitive, and social data (Shaffer et al., 2016). In a study of GenAI-supported language learning, for example, Wang et al. (2023) used epistemic network analysis to model connections between learners' perceptions of GenAI interactions (e.g. feeling a social connection), learning approaches, enjoyment, and motivations, and compared the network structures across different groups of learners based on their actual GenAI interaction behaviors. This approach could be used to model, for example, how the satisfaction of basic psychological needs connects to indicators of deep cognitive engagement, or how perceived threats to these needs link to superficial learning strategies.

While these approaches excel at identifying behavioral patterns, it is important to recognize that digital trace data reveal what learners do but are often insufficient for causal inference (Baker et al., 2020; Talbi & Ouared, 2022). A trace analysis might show that a learner disengaged with a GenAI tutor, but determining the underlying cause, be it a sense of diminished autonomy or cognitive overload, requires moving from behavioral description to active experimentation. Many of the competing hypotheses in the previous sections can be examined through experimental research such as randomized controlled trials. For instance, gamified elements like badges and leaderboards are proposed to boost engagement, yet they risk crowding out intrinsic motivation by overemphasizing external rewards. Researchers could randomly allocate participants to GenAI systems that frame rewards differently: one with points and badges as informational markers of progress, and the other with a more controlling setup of leaderboards that highlight competitive social comparison. Measuring autonomous engagement with learning after these rewards are removed, researchers could identify the conditions in which gamification supports versus undermines motivation in the long run (e.g. Coelho et al., 2025).

The need for insights beyond descriptive analytics opens another, less conventional, methodological opportunity: the design and implementation of *just-in-time adaptive interventions*. This type of experimental design aims to deliver personalized support precisely in moments of need (Hsu et al., 2025). Instead of analyzing learner behaviors after the fact, it enables researchers to probe motivational and cognitive states in real time. Unlike randomized controlled trials that focus on comparing the average treatment effects between groups of learners, just-in-time adaptive interventions are focused on understanding within-person dynamics, that is when, for whom, and in what context an intervention works best (Hiver & Nagle, 2024). Typically, this approach operationalizes behavioral intervention through several components: the ultimate goal (distal outcome), intermediate objectives that act as mediators (proximal outcomes), time points for deciding intervention (decision points), contextual

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data for personalization (tailoring variables), various types of intervention (intervention options), and rules for adaptive intervention (decision rules) (Hsu et al., 2025, p. 3). By systematically drawing on digital trace data and/or *ecological momentary assessment* that captures learners' real-time motivation, just-in-time adaptive interventions provide a framework for building person-centered causal models of GenAI-mediated motivation.

While this approach offers an unparalleled opportunity for causal inference, designing and implementing these complex and adaptive interventions can be resource-intensive and often require advanced technical infrastructure and participant time. An alternative and more scalable approach that can complement real-time interventions is *factorial survey experiment*. Widely used in sociological research, this method uses an experimental design within a survey by presenting respondents with systematically varied vignettes – that is, brief hypothetical scenarios in which multiple attributes (e.g. levels of autonomy support, feedback type, or task difficulty) are systematically manipulated to examine their independent and combined effects – in order to isolate the causal effects of different factors on judgement, decision-making, or behavioral intention (Petzold, 2022). In this context, a factorial survey can be used as a cost-effective screening tool to determine the relative importance of multiple causal factors of motivation and provide insights into what factors to prioritize when designing real-time motivational support.

In addition to serving as the research context, GenAI can also serve as a research tool at various steps in the research cycle. While GenAI has not yet been widely adopted in researching motivation, we see great potential in it for enabling research at greater scale and depth than previously feasible and for opening new lines of inquiry.

In terms of data collection, GenAI-powered chatbots have been shown to automate the administration of randomized controlled trials and perform interviews to acquire structured and open-ended data, which allows for large-scale experimentation (Cingillioglu et al., 2024). GenAI tools also offer powerful support for data analysis. Researchers have been experimenting with using large language models to analyze interview transcripts to identify themes and key factors, which can enable large-scale qualitative analysis at unprecedented scale and speed (Jalali & Akhavan, 2024). For quantitative analysis, GenAI can also lower the programming threshold for researchers and facilitate exploratory data analysis and data visualizations through natural language interactions (DeJeu, 2024).

Beyond roles in data collection and analysis, GenAI also innovates methodological paradigms such as *agent-based modeling* to simulate complex human interactions in virtual environments (Gao et al., 2024). In simulations like Stanford's Smallville virtual town, GenAI agents with independent goals and memories form relationships and display emergent behaviors (Park et al., 2023). This creates intriguing opportunities for studying the underexplored social mechanisms of motivation and allows researchers to see and theorize how individual motives may interact with group dynamics and social relationships. In addition to simulating social behaviors, researchers are also fine-tuning large language models to overcome the limitations of traditional methods, such as think-aloud protocols, including task interference and incomplete reporting. Zheng et al. (2025), for instance, trained large language models on authentic learner interaction data to create learner persona capable of retrospectively verbalizing the thought

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processes. This opens a new window into learners' cognitive and motivational strategies that can complement insights from real-time human recall and verbal reporting.

Another emerging direction for using GenAI to aid language motivation research is that of *generative psychometrics*, where GenAI is used for (co-)creating measurement instruments. Researchers are now partnering with GenAI to streamline the resource-intensive process of psychometric scale development (Beghetto et al., 2025). In this approach, large language models can generate new scale items based on theoretical definitions of constructs. They can also check the coherence of existing items against intended constructs and modify wording for greater clarity. Taking a step further, generative models can also simulate synthetic participants to pre-evaluate scale items and reserve human data for confirmatory tests (Khalil et al., 2025). This can be helpful for addressing issues of construct validity observed in traditional language motivation research (Al-Hoorie et al., 2024) or creating new measures for GenAI-mediated motivation. Specifically, new scales could be developed to measure motivational constructs unique to GenAI-mediated learning, such as learners' sense of relatedness in GenAI-mediated learning.

Methodological challenges

While researching GenAI-mediated motivation offers promising and profound opportunities, it also introduces significant methodological challenges. Issues of data privacy, algorithmic bias, hallucinations, and lack of transparency are relevant to any research involving GenAI, but they have direct implications on the methodological opportunities outlined above and the research agenda we develop in the final section.

One of the most immediate challenges lies in the vast amount of sensitive data generated by GenAI learning systems. The high granularity of the digital trace data raises concerns about privacy and informed consent. Digital traces and adaptive interventions may easily exceed what participants understood when they agreed to participate (Wintrup, 2017). In the case of GenAI-powered learning platforms, informed consent becomes a moving target as it is impossible to foresee all potential future uses and risks of data collected, and sometimes insights about the value and connections within the data are only visible after data analysis (Cormack, 2016). The granularity of data also means the risk of de-identification is higher. Even when anonymized, multiple sources of data can be triangulated to unmask individuals (Wintrup, 2017). To further complicate the issue, ethical guidelines are sometimes too vague to guide practical decisions or create conflicts that are difficult to resolve. For instance, in a collaborative GenAI learning environment, one student's right to data may directly conflict with another's right to erasure (Kitto & Knight, 2019). Similarly, protecting the privacy of user data may inadvertently deny students access to more effective educational support (Kitto & Knight, 2019).

Another set of challenges comes from the very nature of GenAI, specifically algorithmic bias and hallucinations. Algorithmic bias is not a superficial flaw but is inherently embedded at every stage of a large language model's life cycle, from the historically biased web data to the preferences of human coders during fine-tuning (Lee et al., 2024). This poses validity challenges for the methodological opportunities enabled by GenAI. Research in education has shown, for example, that GenAI models can provide differential responses based on implicit proxies for race and social class,

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such as school type (Warr et al., 2025). Consequently, in any research that draws on GenAI-generated data, it is important to differentiate whether observed patterns are artifacts of a biased system or genuine reflections of student learning. The same risk also applies to the case of GenAI simulations, which may reproduce harmful stereotypes or generate responses through a biased lens.

The prevalence of GenAI hallucinations, where GenAI generates content that is made up or inconsistent with instructions, is also a serious cause for concern. This poses a threat to methodological validity as GenAI tools may introduce fabricated information. While quality control techniques such as using large language models as a judge of response quality have been proposed to address this issue at scale, they have not yet reached the threshold of a reliable substitute for human judgment (Qian et al., 2026). In researching the quality of GenAI-generated learning scaffolds, Qian et al. (2026) found that even advanced models only showed a moderate level of alignment with human expert evaluations. Even as GenAI continues to approximate human-like intelligence, rigorous human judgment remains the gold standard for ensuring the quality and integrity of GenAI-mediated research (Khalil et al., 2025).

A third methodological challenge arises from GenAI's lack of transparency. Many machine learning-based models function as computational "black boxes" and are difficult for humans to understand the internal logic of the data generation process (Türkmen, 2025). This issue is particularly salient in motivation research, where GenAI systems may be used to infer or respond to learners' motivational states and consequences (e.g. engagement or disengagement), yet the features driving these inferences often remain unclear, raising concerns about construct validity. This may lead to issues of reproducibility as output generated by proprietary or poorly documented models cannot be independently verified (Helregel, 2025). The adoption of open-source models with meticulous documentation of relevant configurations becomes crucial for enhancing the reproducibility of GenAI-mediated research. In the meantime, researchers also advocate for the integration of explainable GenAI techniques into educational applications. These are methods that are designed to reveal the features and reasoning behind GenAI models, which can help enhance the transparency and accountability of GenAI applications in research (Türkmen, 2025).

Taken together, we believe that embracing these opportunities and challenges in researching GenAI-mediated language motivation will advance the field toward both theoretical and methodological maturity (Al-Hoorie & Hiver, 2025; Al-Hoorie et al., 2023; Liu & Henry, 2025). With the increasing integration of GenAI into language learning, we foresee a shift from a primary reliance on correlational research and self-report data to paradigms that prioritize causal inference and longitudinal behavioral evidence. We expect to see learning analytics and experimental research to feature more prominently in the research agenda, working in conjunction with traditional methods such as surveys and interviews. In parallel, we also anticipate increasing collaboration between GenAI and human researchers to facilitate scalable yet responsible research with human oversight remaining central. We also believe it is imperative to ground the research agenda with a commitment to open science to ensure that methodological innovations are accessible, transparent, and responsible. Ultimately, these advancements will better equip the field to empirically investigate the central

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tensions outlined so far: whether GenAI fosters autonomy or dependence, enriches or thins social connection, and promotes deep engagement or superficial learning.

Putting it all together

The discussion so far has emphasized both the promises and the pitfalls of GenAI in shaping learners' motivation, autonomy, and engagement. While early studies have explored classroom uses of GenAI or learners' immediate attitudes toward these tools, the field now faces deeper theoretical and empirical challenges. The questions below synthesize the themes discussed above and aim to guide sustained programs of research, rather than isolated studies, in the years ahead. They are, therefore, intentionally open-ended, inviting interdisciplinary collaboration among applied linguists, psychologists, technologists, and educators.

Balancing autonomy and dependence in GenAI-mediated learning

GenAI systems can support learner autonomy through adaptive feedback and personalized scaffolding, yet they can also risk producing overreliance or *algorithmic dependence*. Future research must move beyond short-term perceptions to examine how autonomy develops, or deteriorates, through prolonged GenAI use.

- Under what long-term conditions does GenAI enhance learners' sense of choice, control, and volition rather than subtly diminishing it?
- How can design features such as transparency, explainability, and adjustable guidance help preserve genuine self-regulation?
- How can adaptive feedback and personalized scaffolding be designed to promote independence instead of fostering algorithmic dependence?
- What theoretical refinements to current conceptualizations of autonomy are needed to describe co-agency between human learners and intelligent systems?
- How might educators measure or model *authentic autonomy* in environments where part of the decision-making process is delegated to algorithms?
- What pedagogical frameworks can help learners internalize GenAI-assisted experiences so that agency remains genuinely human-driven?

Sustaining motivation beyond the novelty effect.

A recurring concern in educational technology is that early engagement often fades once the novelty wears off. The same risk applies to GenAI, whose initial excitement may mask shallow or extrinsic forms of motivation.

- What instructional or design principles enable GenAI tools to maintain learner engagement after the novelty period passes? Which design features (e.g. personalization, narrative framing, social interaction) transform short-term excitement into durable, high-quality motivation?
- How can GenAI environments be structured to cultivate curiosity, persistence, and self-endorsed goals rather than efficiency-driven shortcuts?

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- How does continuous interaction with GenAI affect the internalization of goals, especially when convenience and speed dominate user experience? How does long-term exposure to GenAI tools reshape learners' goal orientations and persistence in language study?
- Can longitudinal research identify motivational trajectories across repeated or long-term exposure to GenAI-mediated learning? If longitudinal data reveal declining motivation or dependence on GenAI, what instructional or technological adjustments can help re-engage learners and restore self-determined motivation?

Rehumanizing digital learning: Social and relational dimensions

Motivation is not only cognitive but deeply social. The integration of GenAI challenges how relatedness, the need for belonging, and authentic connection are met in virtual environments.

- To what extent can GenAI simulate, facilitate, or hinder authentic social relatedness in language learning? Can GenAI simulate meaningful social interaction, and how do learners perceive the authenticity of these relationships?
- How can GenAI complement rather than replace teacher–student and peer-to-peer communication?
- What design features foster *digital empathy*, trust, and collaboration without blurring ethical boundaries between human and machine partners?
- How might cross-cultural or multilingual contexts influence how relatedness is experienced in GenAI-supported language learning?

Ethics, equity, and motivational justice

As GenAI technologies become unevenly distributed across institutions and societies, questions of access and bias take on motivational as well as ethical importance. Learners who feel marginalized by technological inequalities may experience diminished competence and belonging.

- How do disparities in access to GenAI tools influence learners' motivational opportunities and perceived fairness?
- In what ways do algorithmic biases (e.g. toward particular languages or cultural norms) shape motivation, identity, and engagement? In what ways do these algorithmic biases and linguistic privilege shape students' perceived competence, autonomy, and relatedness?
- How can motivational research incorporate principles of justice, inclusion, and sustainability when evaluating GenAI interventions?
- What policies or institutional frameworks are needed to ensure that motivational benefits of GenAI are equitably distributed?

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Redefining the teacher's role in GenAI-rich environments

Teachers remain the central architects of learning motivation, yet their professional identity is being redefined by GenAI. Rather than being displaced, teachers may need to evolve into mediators, curators, and motivators within hybrid human–AI ecologies.

- How does the way teachers frame and model GenAI use shape students' motivational orientations and ethical perceptions?
- What kinds of professional development best prepare teachers to act as motivational gatekeepers of GenAI integration
- How can teacher–AI collaboration be theorized as a partnership of complementary expertise rather than a replacement dynamic?
- How does teachers' own metamotivation (Al-Hoorie, 2024) adapt when GenAI becomes part of their pedagogical practice?

Reconceptualizing motivation theories for a GenAI era

The emergence of GenAI invites reflection on whether existing motivational constructs remain sufficient. Concepts like autonomy, competence, and relatedness may acquire new meanings when learning is co-constructed with intelligent systems.

- Do the foundational needs of SDT retain their traditional interpretations in GenAI-mediated learning, or do they require reconceptualization?
- What new constructs – such as *algorithmic autonomy, digital relatedness*, or *co-agency* – are emerging, and how can they be operationalized?
- How might motivational theory evolve to include hybrid forms of agency that involve both human intention and machine input?
- Could entirely new motivational frameworks be needed to capture the dynamics of human–AI interaction in learning contexts?

Methodological innovation and open science

The availability of vast digital trace data, combined with the analytic capacities of GenAI itself, opens new methodological horizons for motivation research but also new ethical responsibilities.

- How can learning analytics and natural language processing be used to model motivational change with rigor and transparency?
- What ethical and methodological standards are needed to ensure transparency, reproducibility, and data privacy in GenAI-mediated research?
- How can open science principles – such as data sharing, pre-registration, and replication – be adapted to protect privacy while advancing reproducibility in GenAI-related studies?
- What forms of interdisciplinary collaboration are needed to ensure that GenAI tools are used ethically and meaningfully in motivational research itself?

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The future value of language learning in a GenAI-mediated world

Perhaps the most profound challenge lies in re-articulating *why* language learning matters at all in an age of instantaneous translation and global GenAI communication, especially in contexts where language programs are increasingly subject to institutional downsizing and reduced financial support (Thompson et al., 2025). The motivational stakes are high: If learners no longer see intrinsic or even instrumental value in mastering another language, the field must redefine its relevance.

- What enduring cognitive, cultural, and identity benefits continue to justify the pursuit of L2 learning despite GenAI's growing capabilities?
- How can researchers empirically demonstrate that language learning remains central to human communication, empathy, and cross-cultural understanding?
- How might changing societal perceptions of linguistic competence influence learners' motivation and the institutional value placed on L2 education?
- In what ways do societal shifts – such as changing employment requirements or evolving global networks – reshape learners' perceived value of L2 study?
- How can the language teaching profession reframe its goals to inspire learners who live in a GenAI-mediated, multilingual world?

Conclusion

In most academic papers, the conclusion summarizes the main arguments and points to directions for future work. Since this paper has been about setting a research agenda, however, we would instead like to end with a proposition for L2 motivation researchers (see Reinders & Benson, 2017; Richards, 2015). This proposition is predicated on the common experience that deep and meaningful mastery of a skill rarely takes place within the four walls of the classroom. Rather, mastery develops through sustained and passionate engagement outside of class. Building on this recognition, our proposition is as follows: The classroom should *not* be seen as the primary site of L2 acquisition. Instead, it should serve as a catalyst, an instigator that inspires learners to pursue the language *beyond* its boundaries. The function of the classroom, then, is to provide experiences for learners to enjoy the L2, ignite passion for it, and feel excitement about the prospect of mastering it, so that the spark of motivation carries them forward in their learning journey. With the arrival of GenAI, it has now become possible to design engaging activities outside the classroom, monitor progress, and evaluate effectiveness in ways that were not feasible before. Future research should, therefore, examine how teachers can best create classrooms that serve as launchpads for lifelong language learning in GenAI-mediated contexts, ensuring that the spark kindled inside continues to burn brightly outside.

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