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Student Motivation and Self-Regulation in GenAI-Assisted English Writing

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ABSTRACT

Generative artificial intelligence (GenAI) has entered higher education very quickly and has changed the way learners engage with English academic writing, now accompanying them through the whole composing process from idea formation and planning to revision and polishing. Its influence, however, does not stop at text production. A significant challenge for educators is the effect of GenAI on learners' internal processes, in particular their motivation and self-regulated learning (SRL). This paper examines the existing literature on GenAI, academic writing and learner psychology through Zimmerman's cyclical model of SRL and the self-determination theory of Deci and Ryan. The literature suggests that GenAI tools can build writing confidence and promote independent learning where they scaffold learners' own thinking. Where learners instead use GenAI to produce ready-made text, important self-regulatory capacities such as goal setting, monitoring and reflection may be weakened. Existing studies are almost entirely cross-sectional, so claims about sustained effects cannot be made, and work situated in Indian higher education remains scarce. The paper therefore sets out a research agenda built on longitudinal methods, theoretically integrated models and context-relevant approaches to AI literacy, offering a theoretical basis for researchers and practitioners concerned with the changing role of GenAI in language teaching and learning.

Keywords: *generative artificial intelligence, GenAI, academic writing, English as a foreign language, self-regulated learning, self-determination theory, writing motivation, higher education*

I. INTRODUCTION

In recent years, generative artificial intelligence (GenAI) systems have moved from being a fringe educational technology to an integral part of learning environments. Tools such as ChatGPT, Grammarly and QuillBot have become common partners in the writing process, offering real-time help with vocabulary, grammar, organisation and the building of arguments

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(Godwin-Jones, 2022; Kohnke et al., 2023). This shift has happened at remarkable speed: research output on artificial intelligence in higher education rose sharply between 2021 and 2022, following the public release of large language models (Crompton & Burke, 2023). The significance of the development is especially marked for the academic writing of students learning English as a second or foreign language. Writing academic papers has long been recognised as one of the most difficult and stressful activities EFL learners undertake (Cheng, 2004), and GenAI tools have begun to change that reality (Barrot, 2023; Song & Song, 2023).

This rapid integration raises significant questions. As GenAI tools enter both classroom teaching and individualised learning, researchers have begun to examine their influence on deep learning rather than on task performance alone. Two psychological constructs come into play at this stage: motivation and self-regulated learning (SRL). Motivated individuals sustain effort and persist in the face of difficulty, while self-regulating learners take responsibility for planning, monitoring and evaluating their own actions (Boekaerts, 1999; Panadero, 2017; Zimmerman, 2002).

Such tools create complications that are not yet fully understood. One positive possibility is that GenAI-based feedback may reduce the affective barriers many students face at the outset of the writing process, helping to develop a provisional sense of competence, which self-determination theory (SDT) identifies as one of the three basic psychological needs (Ryan & Deci, 2000). Empirical research tends to support that optimism. ChatGPT-assisted instruction has been shown to enhance both the writing and the motivation of EFL undergraduates (Song & Song, 2023), while formative GenAI feedback has helped improve the academic writing of students in India (Mahapatra, 2024). At the same time, dangers are associated with GenAI feedback tools. By outsourcing the writing process to GenAI, students may circumvent the reflective and goal-oriented thinking that is a cornerstone of self-regulation (Ryan & Deci, 2017). This concern finds support in experimental work indicating that learners tend to use GenAI-based tools rather than learn from them, and that their independent performance declines once the tools are withdrawn (Darvishi et al., 2024).

Despite the increase in empirical studies, the domain still suffers from methodological and theoretical fragmentation. Many studies assess writing outcomes such as quality or task completion but do not look into the motivational and regulatory processes underlying them, which is consistent with the broader finding that educational applications of artificial intelligence rest on weak theoretical foundations (Zawacki-Richter et al., 2019). A recent mapping review at the intersection of artificial intelligence and SRL suggests that the motivational dimension of self-regulation remains the least explored area of GenAI-facilitated

learning (Banihashem et al., 2025). There is also a significant geographical imbalance in the evidence base. Almost all research has been conducted in universities in East Asia and Western countries, whereas other settings, in particular Indian universities, are only starting to attract scholarly attention (Mahapatra, 2024; Rana, 2026; Roy & Swargiary, 2024). Indian institutions deserve closer consideration: India runs one of the largest higher education systems in the world, English is the language of instruction in most institutions, and GenAI writing technologies are spreading rapidly.

Given this situation, the present literature review has three aims: to summarise existing knowledge on the associations between GenAI use, student motivation and self-regulated learning in academic English writing; to assess the methodological quality and theoretical consistency of that knowledge; and to develop an agenda for future research on the gaps identified, with particular attention to understudied settings and integrated theoretical frameworks (Deci & Ryan, 1985; Ryan & Deci, 2000; Zimmerman, 2002).

II. THEORETICAL FRAMEWORK

A. Zimmerman's Cyclical Model of Self-Regulated Learning

Self-regulated learning views the learner as an active agent who controls their own thinking by monitoring, directing and assessing it. In technology-rich settings this control becomes particularly significant, since students must decide how far to rely on the technological resources available (Broadbent & Poon, 2015; Zimmerman, 2002). Zimmerman's model presents SRL as a cycle of three interrelated phases: forethought, performance and self-reflection (Panadero, 2017; Zimmerman, 2002). The model has been applied successfully to writing, where it treats self-regulation in terms of environmental, behavioural and covert personal processes coordinated during composition (Zimmerman & Risemberg, 1997). A recent mapping review found that Zimmerman's approach was the most widely used SRL framework in research on artificial intelligence in learning (Banihashem et al., 2025).

The forethought phase is characterised by the planning and motivational activity that precedes writing: goal setting, strategic planning and the development of self-efficacy. The effectiveness of this phase in GenAI-assisted writing depends heavily on students' intentions. Students with well-defined goals and a clear strategy for using GenAI as support rather than as a substitute for their own work are better able to manage their learning. Students who use the technology mainly to save time, without reflection, are likely to skip forethought altogether, which is precisely what instructional models that build GenAI into the pre-writing stage seek to avoid (Su et al., 2023).

In the performance phase, students draft, monitor their progress and implement strategies. GenAI tools introduce a new layer of complexity here. When a student weighs a GenAI suggestion against their own version and makes a conscious decision, that is genuine self-monitoring. When a student accepts every suggestion uncritically, it is not. Case-study evidence on automated feedback highlights this difference: students typically show superficial rather than deep cognitive engagement with the recommendations of such tools, despite a positive affective connection with the tool itself (Koltovskaia, 2020).

The phase that follows task completion is self-reflection, in which the quality and efficiency of the work are assessed. It is through this reflective cycle that writers develop their own academic voice (Graham & Harris, 1997; Zimmerman & Risemberg, 1997). Where GenAI is used routinely, students may lose access to the performance information that reflective processes require. As Boekaerts (1999) observes, self-regulation involves not only the cognitive aspects of learning but also emotional reactions to success and failure, with the self acting as the filter through which learning experiences are perceived.

B. Self-Determination Theory

While Zimmerman's model sets out the structure of self-regulation, self-determination theory supplies its motivational underpinning. For Deci and Ryan (1985), human motivation is most productive when it comes from within rather than from external pressure, that is, when people act because they find the activity itself worthwhile. SDT identifies three basic psychological needs that support intrinsic motivation: autonomy, competence and relatedness (Ryan & Deci, 2000; Vansteenkiste et al., 2020). The theory has been studied extensively in language education, where more self-determined forms of motivation are associated with persistent and intensive second language acquisition (Noels et al., 2000).

Autonomy relates to a sense of ownership over the writing process. The available evidence suggests that when students treat GenAI as a collaborator that strengthens their own voice, rather than as a machine that produces text for submission, their autonomy and intrinsic motivation remain largely unimpaired (Ryan & Deci, 2000). Ownership and engagement decline, however, when authorship shifts from the student to the technology, a tension identified as one of the central contradictions of GenAI-generated text (Ryan & Deci, 2017; Warschauer et al., 2023).

Competence concerns what learners believe about their capacity to accomplish a task, and it is among the strongest predictors of both writing motivation and writing performance, independent of actual writing ability (Pajares, 2003). GenAI can be highly beneficial here

through scaffolding, helping learners attempt work they might otherwise avoid for want of confidence (Mahapatra, 2024; Song & Song, 2023). Such assistance helps, however, only where it enables learners to acquire the underlying cognitive skills for themselves. Otherwise the sense of competence may be illusory. A recent meta-analysis found that ChatGPT use was associated with improved academic performance but not with gains in learner self-efficacy (Deng et al., 2025).

Relatedness refers to the need for connection and support within a learning community. Although GenAI is not a social being, it can act as an ever-present and non-judgmental source of feedback. For EFL learners it may help to reduce the social anxiety attached to receiving feedback from peers or instructors (Cheng, 2004), providing a psychologically safer space for taking risks (Ryan & Deci, 2017). Taken together, these considerations open avenues for research into how GenAI affects learners' motivation, and not their writing performance alone (Kryshko et al., 2020; Schwinger et al., 2009).

C. Toward an Integrated Lens

Although these two models are usually applied independently, their explanatory power is fully realised only when they are used together. Research on motivational regulation shows that the effort invested in managing and regulating one's own motivation mediates the relationship between strategy use and academic performance (Kryshko et al., 2020; Schwinger & Stiensmeier-Pelster, 2012). Motivational regulation is, moreover, treated as a component of self-regulation in L2 writing rather than as a separate construct (Teng & Zhang, 2016). Within an integrative approach, SDT can explain why a learner chooses to engage authentically with a GenAI tool, while Zimmerman's framework explains how that engagement unfolds and is controlled. This review therefore adopts an integrative stance: the fulfilment of motivational needs is treated as the activating element of the forethought phase, and self-regulation during the performance and reflection phases in turn shapes learners' autonomy and competence.

III. METHODOLOGY

A. Search and Selection Strategy

The literature was searched systematically across five databases: Scopus, Web of Science, ERIC, ScienceDirect and Google Scholar. The search strategy used Boolean strings combining terms such as "artificial intelligence" AND "academic writing" AND "motivation"; "generative artificial intelligence" AND "self-regulated learning" AND "EFL"; and comparable variants. The search was designed to be broad enough to capture interdisciplinary work while remaining narrow enough to yield a manageable number of publications.

Four inclusion criteria were applied. First, as to scope, studies had to address English writing in an ESL or EFL context. Secondly, as to publication date, peer-reviewed articles published between 2015 and 2026 were included, so that both the period before generative artificial intelligence and the period following the release of ChatGPT are captured. Thirdly, as to subject, studies were included where motivation or self-regulated learning featured as an outcome, a mediator or a focal construct. Lastly, landmark theoretical works (for example, Deci & Ryan, 1985; Zimmerman, 2002; Zimmerman & Risemberg, 1997) were not excluded on the basis of publication date.

B. Analytical Framework

Thematic analysis was the principal method used to structure and interpret the selected literature. Studies were grouped into four thematic categories: motivational processes and learner engagement; SRL strategy use in GenAI-assisted writing; the tension between learner autonomy and dependence on GenAI; and individual factors such as proficiency level and AI literacy. Read against the two theoretical foundations described above, Zimmerman's cyclical model and SDT, the review is able to move beyond mere enumeration towards a more holistic account (Ryan & Deci, 2017; Zimmerman, 2002).

IV. GENAI-ASSISTED ENGLISH WRITING: ANALYSIS AND INTERPRETATION

A. Motivation and the Competence-Autonomy Nexus

A recurring theme across the reviewed papers is that, used well, GenAI helps to remove some of the affective barriers to academic writing. Writing anxiety is a complex problem for L2 writers, with somatic, cognitive and avoidance dimensions (Cheng, 2004). For students with weaker English-language skills, GenAI feedback offers a way of relieving the cognitive anxiety of writing in another language (Barrot, 2023; Song & Song, 2023). In SDT terms, such relief matters for motivation because it gives students the provisional sense of competence they need in order to proceed (Ryan & Deci, 2000). This is consistent with findings that positive emotions and supportive conditions are preconditions for the development of writing motivation (Bruning & Horn, 2000), and with evidence that self-efficacy beliefs shape the writing process independently of actual skill (Pajares, 2003).

Intervention research provides further empirical support. Song and Song (2023) report that ChatGPT-assisted instruction enhanced both the writing ability and the motivation of EFL undergraduates relative to a control group. In the Indian context, Mahapatra (2024) found that using ChatGPT as a feedback tool had a significant positive effect on the academic writing of ESL students, alongside very favourable student perceptions, while Roy and Swargiary (2024)

observed improvements in both writing ability and engagement among EFL undergraduates in Delhi.

The relationship between GenAI use and learner autonomy is more complicated. In studies of pedagogically framed GenAI use, where learners were directed to use the tool to grasp linguistic structures rather than as a substitute for their own writing, higher levels of intrinsic motivation and personal investment in the final product were observed (Ryan & Deci, 2017; Su et al., 2023). Conversely, where learners used GenAI to produce the final text, their motivation shifted towards a more extrinsic orientation in which the aim of writing became completion of the assignment rather than development of skill. Extrinsic orientation of that kind has long been associated with lower persistence in the SDT literature (Noels et al., 2000). This poses a serious problem for writing development and reflects the broader tension researchers identify in debates on the usefulness of GenAI for writing instruction (Warschauer et al., 2023).

B. The SRL-GenAI Interaction

Empirical studies show an imbalance in GenAI use across the phases of Zimmerman's self-regulated learning cycle. Students draw on GenAI most frequently during the performance phase, to correct grammar, improve sentence-level fluency and revise structure, and this pattern holds across studies and student cohorts (Godwin-Jones, 2022; Koltovskaia, 2020; Panadero, 2017). The forethought phase, in which students set goals, analyse the task and plan before writing, receives far less attention. Few students are observed using GenAI for goal setting, argument planning or identifying gaps in their own knowledge before writing, even though such use is entirely possible.

This asymmetry matters because forethought is arguably the single most important determinant of self-regulatory quality. A writer who begins with clear goals and a deliberate strategy is far better placed to monitor and evaluate the work than one who begins without direction (Zimmerman, 2002; Zimmerman & Risemberg, 1997). The current pattern of use, concentrated on error correction and surface revision, suggests that GenAI is functioning as a reactive tool rather than as a proactive support for higher-order planning.

The manner of engagement during the performance phase is equally significant. Studies of automated written corrective feedback indicate that learner engagement is often superficial: learners may be affectively engaged with the feedback while processing it in a very limited cognitive way (Koltovskaia, 2020), and generic machine feedback elicits less successful revision and greater mental effort than specific feedback (Ranalli, 2018). Trust is another decisive factor, since a learner's ability to engage critically with automated feedback depends

on the trust placed in the tool, irrespective of language proficiency, with most learners adopting a proofreading stance towards feedback (Ranalli, 2021). Combining automated evaluation with teacher feedback appears to overcome some of these shortcomings and to produce more accurate revision than teacher feedback alone (Link et al., 2022).

C. Learner Proficiency and AI Literacy

Proficiency is likely to be an important moderator of the relationship between GenAI use and learning outcomes. Less proficient learners tend to focus on accuracy and correctness and to accept GenAI suggestions readily, with little consideration of their appropriateness, whereas more advanced learners are more likely to turn to GenAI for sophisticated purposes such as logical reasoning, disciplinary voice and audience awareness (Ranalli, 2021; Song & Song, 2023). This difference makes AI literacy particularly important, since operating the technology is only one dimension of it. The central dimension is the capacity to assess machine-generated content critically, to question it, and to select what is appropriate to one's developing academic voice (Long & Magerko, 2020; Ng et al., 2021). Current theoretical accounts treat AI literacy as a multidimensional competence encompassing knowledge and understanding of AI, its use and application, evaluation and creation with AI, and the associated ethics (Ng et al., 2021). University AI literacy courses have proved effective in strengthening students' conceptual understanding and sense of empowerment (Kong et al., 2022).

Less proficient students are especially vulnerable to what may be termed passive acceptance, where the output of the tool is taken for granted, accepted without scrutiny and placed into an assignment without further consideration. The difficulty is not only that machine output may be inaccurate. Inserting it unexamined also forecloses the process of linguistic comparison on which the development of second language writing proficiency depends (Warschauer et al., 2023). Meta-analytic evidence likewise indicates that performance benefits from ChatGPT use do not translate into gains in self-efficacy (Deng et al., 2025).

V. CRITICAL GAPS IN THE LITERATURE

The literature reviewed here provides a useful basis for studying how GenAI influences the psychology of writing, but substantial gaps still prevent the field from offering adequate explanations. Six issues stand out.

First, there is almost no longitudinal evidence. The studies conducted so far use cross-sectional designs, in which learner experience is examined at a single point in time. It is therefore impossible to determine whether sustained use of GenAI strengthens or weakens learners' self-regulation (Banihashem et al., 2025; Darvishi et al., 2024).

Secondly, there is a pronounced geographical and situational bias. Recent research concentrates on East Asian and, to a lesser degree, Western higher education settings (Deng et al., 2025; Zawacki-Richter et al., 2019). Such research is valuable but limited in generalisability. The Indian higher education context, marked by linguistic diversity, wide variation in English language proficiency and fast-growing GenAI adoption, remains severely understudied, and only a few recent publications attempt to address it (Mahapatra, 2024; Rana, 2026; Roy & Swargiary, 2024).

Thirdly, the field is theoretically disconnected. Many studies treat motivation and self-regulation as independent constructs rather than as processes that influence one another, artificially separating two aspects that interact in real learning environments (Kryshko et al., 2020; Panadero, 2017; Teng & Zhang, 2016). Integrated approaches of the kind described above are not found in current research designs, and several reviews of artificial intelligence in education point to the weak theoretical basis of the field as a whole (Zawacki-Richter et al., 2019).

Fourthly, there is definitional vagueness around GenAI over-reliance. The possibility of excessive dependence on the technology is frequently discussed but rarely defined: none of the reviewed studies offers an empirical threshold separating effective scaffolding from harmful over-reliance (Barrot, 2023; Darvishi et al., 2024). There is consequently no way of measuring over-reliance or of grounding practical claims about instructional design in such a measure.

Fifthly, collaboration has received insufficient attention. Almost all research on GenAI in writing assumes that writing is an individual activity, whereas collaborative writing is increasingly common. Little is known about how GenAI tools are negotiated in group writing, or about their effect on collaborative process and shared responsibility (Warschauer et al., 2023).

Finally, the field lacks observation-based methodology. Self-report is the primary method of data collection in almost all the reviewed articles. Self-report can be useful, but it is prone to social desirability bias and is an unreliable measure of cognitive process. Future research would benefit from observational methods such as screen-capture logging and keystroke analysis (Banihashem et al., 2025; Koltovskaia, 2020).

VI. PRIORITIES FOR FUTURE INVESTIGATION

These gaps point to a clear need to redirect the research agenda. Rather than accumulating further cross-sectional survey evidence on the general usefulness of GenAI, researchers should move towards process-based, longitudinal and theoretically grounded investigation. Four priorities emerge from the reviewed literature.

Priority 1: Longitudinal tracking of SRL trajectories. Future studies should follow student writers across whole semesters or academic years and measure goal setting, monitoring and reflective behaviour repeatedly. This would make it possible to observe how self-regulation patterns change over time as experience with GenAI tools grows (Banihashem et al., 2025; Zimmerman, 2002). Experimental designs in which GenAI is introduced gradually and then withdrawn, as used by Darvishi et al. (2024), would be particularly helpful.

Priority 2: Grounded in-context studies in India. Multisite studies of GenAI implementation in Indian universities are needed. The initial single-university studies demonstrate the viability of such research and report some short-term benefits (Mahapatra, 2024; Roy & Swargiary, 2024), but they cannot account for the diversity of India's higher education sector. Future studies should consider the social and linguistic factors that shape the performance of Indian students writing in English as a second or foreign language, together with the institutional conditions under which GenAI tools are adopted (Rana, 2026).

Priority 3: Operationalising GenAI dependency empirically. Mixed-method designs combining behavioural observation with psychometric measurement of self-regulation are needed in order to operationalise GenAI over-reliance. Existing measures of self-regulated writing strategies (Teng & Zhang, 2016) and accounts of superficial processing of automated feedback (Koltovskaia, 2020; Ranalli, 2021) offer a sound basis for developing such an instrument.

Priority 4: Integrative modelling of motivation, literacy and regulation. Future studies should use structural equation modelling to examine the pathways connecting AI literacy, SDT-grounded motivational constructs and SRL strategy use (Deci & Ryan, 1985; Ng et al., 2021; Ryan & Deci, 2017). Modelling of this kind would allow researchers to test competing theoretical accounts, including the mediating role of effort management identified in motivational regulation research (Kryshko et al., 2020; Schwinger et al., 2009; Schwinger & Stiensmeier-Pelster, 2012), and to identify the mechanisms through which GenAI use affects writing development.

VII. IMPLICATIONS FOR PEDAGOGY AND INSTITUTIONAL PRACTICE

While the principal value of this review is theoretical, several practical implications emerge from the synthesis. As to classroom practice, the reviewed evidence supports structured and transparent incorporation of GenAI in preference either to prohibition or to a laissez-faire approach. Instructional designs that build GenAI into the pre-writing and reflection phases, rather than the drafting phase alone, are more likely to engage the whole self-regulation cycle

(Su et al., 2023; Zimmerman, 2002). Teacher feedback and automated feedback used together appear to yield better revision outcomes than either source in isolation (Link et al., 2022).

As to curriculum design, AI literacy should be treated as an essential academic skill rather than an auxiliary one. Structured teaching can help students acquire the evaluative and ethical capacities needed to analyse machine output critically (Kong et al., 2022; Long & Magerko, 2020; Ng et al., 2021). Such teaching is likely to be most effective where it addresses both how the technology works and when its use promotes, and when it undermines, learners' own development (Warschauer et al., 2023).

As to institutions, particularly those in rapidly digitalising environments such as India, the implication of this body of research is that policies resting only on cross-sectional evidence will be inadequate. Policy should aim to ensure that the use of GenAI in learning fulfils rather than frustrates learners' basic psychological needs for autonomy and competence (Ryan & Deci, 2017; Vansteenkiste et al., 2020).

VIII. CONCLUSION

The arrival of generative artificial intelligence in academic writing presents both real opportunities and real risks for higher education. Where students work with GenAI purposefully and critically, they may build writing confidence, overcome writing anxiety and develop fluency (Mahapatra, 2024; Song & Song, 2023). Where they work with it passively, accepting every output without thought, there is a genuine prospect that the self-regulation on which skill development depends will be disrupted (Darvishi et al., 2024; Koltovskaia, 2020). It is time to move from describing how these technologies are used to explaining how they interact with learners' motivational and regulatory processes.

The research agenda proposed in this review seeks to address the most salient gaps in the existing literature. It calls in particular for longitudinal designs, integrated theory, and attention to under-studied contexts such as higher education in India. The purpose of such research is not to judge whether GenAI is good or bad for writing instruction, but to identify the conditions under which it can contribute effectively to the development of independent writers.

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