

Integration of Grit, Cognitive Ability, and Emotion in the Process of Writing Literacy Acquisition in Online Learning

Ryan Dwi Puspita^{1*)}, Duhita Savira Wardani¹⁾

¹IKIP Siliwangi, Cimahi, Indonesia

*Corresponding Author: ryan.dwi@ikipsiliwangi.ac.id

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Abstract

Online learning requires students to have a high level of self-regulation as they acquire academic writing literacy. The complexity of writing tasks limits direct interaction, and demands for independent learning mean that success in writing literacy depends not only on cognitive abilities but also on non-cognitive factors such as grit and emotion. This study examines how grit, cognitive ability, and emotion integrate in the process of writing literacy acquisition in online learning in higher education. This research employed a descriptive qualitative case study involving fifteen master's students in Primary Education at a private university in Cimahi, Indonesia. Data were collected through in-depth interviews, written reflections, and document analysis of academic writing tasks, and were analyzed using thematic analysis. The findings reveal that cognitive ability plays a crucial role in structuring ideas and arguments, while grit sustains persistence in iterative writing processes. Emotion functions as both a mediator and moderator, shaping students' engagement and influencing the effectiveness of cognitive strategies. This study contributes a novel integrative framework highlighting the dynamic interaction of cognitive and non-cognitive factors in online writing literacy acquisition. The findings imply the need for instructional designs that systematically integrate cognitive scaffolding, perseverance development, and emotion regulation in online learning environments.

INTRODUCTION

Writing literacy is an advanced academic competence that requires the simultaneous integration of cognitive, affective, and conative abilities (Condie & Pomerantz, 2020). At the master's level, writing literacy is not merely positioned as a technical academic skill, but also as a means of critical, reflective, and argumentative thinking in constructing professional knowledge. Ideally, students are expected to systematically construct ideas, reflect on instructional practices, and produce meaningful and contextual academic writing. This process requires the optimal functioning of higher-order cognitive abilities, long-term perseverance (grit), and adaptive academic emotion regulation, particularly in the context of

online learning (Freeborn et al., 2023; Paradowski & Jelińska, 2024a; Luan et al., 2025).

The rapid shift toward online learning in the post-pandemic era has introduced complex challenges in the acquisition of writing literacy (Ludewig et al., 2025). Online learning demands higher levels of independence, persistence, and emotional management compared to face-to-face learning. International studies indicate that online environments often generate high cognitive load, limited meaningful interaction, and fluctuating emotions toward learning, which affect the quality of student engagement and academic performance (Luan et al., 2025). In this context, writing literacy is no longer merely a matter of mastering text structure, but rather a complex psychopedagogical process.

Academic emotions also play a critical role in online writing literacy (Wen & Walters, 2022). Emotions such as writing anxiety, frustration due to delayed feedback, and low academic self-confidence can inhibit idea expression and writing quality (Zhang & Jiang, 2025). Research in language learning and literacy shows that emotions not only influence motivation but also function as mediators between personal characteristics and cognitive engagement (Yarmi, 2025). Thus, emotions directly contribute to how students manage writing tasks, interpret feedback, and make meaning of online learning experiences.

Despite the growing body of research on writing literacy, existing studies tend to examine grit, cognitive ability, and emotion in isolation, resulting in a fragmented understanding of the writing process. Many studies treat grit as a quantitative predictor of learning outcomes, particularly in foreign language learning contexts, with a primary focus on achievement (Demir, 2024). Other studies emphasize cognitive writing abilities or metacognitive strategies without explicitly linking them to emotional dimensions and long-term perseverance. Even literacy research in teacher education has often focused more on pedagogical or curricular aspects than on learners' internal psychological processes (Condie & Pomerantz, 2020). Consequently, understanding how grit, cognitive ability, and emotion dynamically interact in the process of writing literacy acquisition, particularly in online learning at the master's level in primary education, remains highly limited.

Few studies have explored how these three dimensions interact dynamically, particularly in online learning contexts at the postgraduate level, where writing tasks are complex and sustained over time. Furthermore, prior research predominantly adopts quantitative approaches, focusing on outcome variables rather than students' internal processes and lived experiences during writing. Therefore, a significant gap remains in understanding how cognitive, affective, and conative dimensions are integrated in the process of writing literacy acquisition. This study addresses this gap by proposing an integrative psychopedagogical perspective.

The educational landscape has undergone a remarkable transformation in recent years, driven by the proliferation of online learning environments and recent technological advancements (Azizi et al., 2022). The transition to online education has not only altered instructional delivery strategies but has also raised critical considerations regarding how these changes influence students' motivation, creativity, and literacy development (Namaziandost & Rezai, 2024). As educational institutions continue to adapt to this new paradigm, understanding the dynamics of motivation and creativity associated with academic content adaptation has become increasingly important. Such understanding is essential for fostering strong writing competence among university students.

Initial observations of the learning process indicate that most master's students continue to experience difficulties in developing arguments, synthesizing literature, and conducting conceptual revisions in academic writing, particularly in online learning contexts. Studies on grit in higher education have demonstrated positive correlations with academic perseverance; however, they have not specifically explained its role in complex and long-term writing literacy processes (Li et al., 2025). Preliminary surveys on emotions in academic writing

reveal high levels of anxiety and affective pressure, yet these are still examined separately from cognitive dimensions and perseverance. This condition indicates the absence of an integrative model that explains the interaction among grit, cognitive ability, and emotion in the acquisition of writing literacy among master's students in Primary Education in online learning settings.

Meanwhile, online writing instruction in practice continues to prioritize final written products over students' learning processes. The integration of grit, cognitive ability, and emotion into the design of online writing instruction has not been systematically implemented, resulting in suboptimal development of students' writing literacy acquisition. Methodologically, several scholars have noted that studies on grit and literacy predominantly employ quantitative survey designs or structural modeling, whereas qualitative research exploring subjective experiences and internal processes remains scarce (Demir, 2024; Luan et al., 2025; Li et al., 2025).

Given these issues, there is a need to integrate grit, cognitive ability, and emotion into a holistic analytical framework (Li et al., 2025). This integrative approach conceptualizes writing literacy as an acquisition process shaped by the interaction of individual perseverance, cognitive capacity, and academic emotional dynamics within online learning contexts (Zhang & Jun, 2023; Neroni et al., 2022; De Vita et al., 2021; Vasylets & Marín, 2021). The novelty of this study lies in its development of a new conceptual understanding of online writing literacy as an integrative psychopedagogical process, rather than merely a linguistic or academic skill. Unlike previous studies that have examined grit or emotion in isolation (Zhu et al., 2022; Pan et al., 2023; Qi et al., 2025), this study emphasizes the dynamic interaction among grit, cognitive ability, and emotion in shaping the process of literacy acquisition in writing. Furthermore, its focus on master's students in primary education provides a significant contextual contribution.

Based on the foregoing discussion, this study aims to examine in depth how grit is manifested in online writing processes, how cognitive ability is employed to manage the complexity of writing tasks, and how emotion mediates and moderates the sustainability of writing literacy acquisition among master's students in primary education.

METHOD

This study employed a qualitative approach with a case study design (Creswell & Creswell, 2017) to examine in depth the process of writing literacy acquisition in online learning within a Master's Program in Primary Education at a private higher education institution in Cimahi, West Java. This approach was selected because the study focuses on a contextual understanding of how grit, cognitive ability, and emotion manifest and interact in students' academic writing processes.

Research Participants and Context

This research involved fifteen master's students in Primary Education at a private university in Cimahi, Indonesia, who participated in online learning based on academic writing assignments. Participants were selected using purposive sampling based on the following criteria: (1) active enrolment status, (2) engagement in online learning that required sustained writing activities, and (3) willingness to participate in the study. A total of ten students participated which was deemed sufficient to achieve data depth and information saturation. The sample size of fifteen participants was considered sufficient to achieve data saturation, as no new themes emerged during the final stages of data analysis. The purposive sampling ensured that participants had rich experience in online academic writing.

Instruments and Data Collection Techniques

The research instruments included: (1) a semi-structured interview guide to explore manifestations of grit, cognitive strategies in writing, and students' emotional experiences during online writing processes; (2) an observation sheet to document student engagement, responses to feedback, and the continuity of writing processes; (3) documentation of academic artifacts, including writing drafts, revised versions, and instructor feedback; and (4) students' written reflections to capture affective and metacognitive dimensions. Data were collected through in-depth interviews, non-participant observations, and document analysis over one semester of online learning.

To ensure data trustworthiness, this study considered credibility, dependability, and confirmability. Credibility was strengthened through prolonged engagement with participants, triangulation of multiple data sources (interviews, observations, and documents), and member checking to validate the findings. Dependability was supported by maintaining clear documentation of the research process, thereby ensuring that the study was traceable and consistent. Confirmability was addressed by minimizing potential researcher bias through reflective notes maintained throughout the research process.

Data Analysis Techniques

Data analysis was conducted using thematic analysis through the following stages: (1) data reduction, (2) open coding and categorization based on the focal themes of grit, cognitive ability, and emotion, (3) presentation of data in thematic narrative form, and (4) interpretative conclusion drawing. The study ensured data trustworthiness through source and technique triangulation, member checking, and repeated data examination to ensure the consistency and credibility of the findings. To ensure the trustworthiness of the data, this study considered aspects of credibility, dependability, and confirmability. Credibility was strengthened through prolonged engagement with participants, triangulation of multiple data sources (interviews, observations, and documents), and member checking to validate the findings.

RESULTS AND DISCUSSION

The research findings comprise three main aspects: the manifestation of grit in sustaining online writing processes, the utilization of cognitive ability in managing the complexity of academic writing tasks, and the role of emotion in mediating and moderating the sustainability of writing literacy acquisition. These three aspects were analyzed integratively to understand how students maintain perseverance, manage cognitive demands, and navigate emotional dynamics within highly self-directed online learning contexts.

Manifestation of Students' Grit in Online Writing Processes

The findings regarding students' grit manifestation in online writing processes are presented in [Table 1](#), which details grit indicators for each participant along with empirical evidence derived from interviews, observations, and academic artifact documentation.

Table 1. Manifestation of Students' Grit in Online Writing Processes

Participant	Grit Indicator	Empirical Evidence (Interviews, Observations, Artifacts)
R1	Perseverance in facing initial confusion	Continued writing by developing an outline; actively participated in online discussions; completed three revisions with improved argument structure.
R2	Persistence in overcoming idea	Experienced frustration but resumed writing after a break; consistently attended online sessions; writing

Participant	Grit Indicator	Empirical Evidence (Interviews, Observations, Artifacts)
	stagnation	quality improved in the final version.
R3	Consistency in the revision process	Accepted repeated revisions as part of learning; responded actively to feedback; conducted substantive revisions to improve argument clarity.
R4	Endurance despite emotional pressure	Experienced decreased motivation after critical feedback; delayed submission but ultimately completed revisions.
R5	Long-term goal orientation	Set personal targets for completing writing tasks; maintained stable engagement throughout the semester; writing developed gradually.
R6	Perseverance and commitment to quality	Felt fatigued by multiple revisions but continued making improvements; actively sought clarification; revised more than twice.
R7	Consistent engagement	Experienced mental fatigue but continued writing; consistently accessed the LMS; revisions were conducted gradually.
R8	Commitment to academic quality	Demonstrated intrinsic motivation to produce high-quality writing; actively engaged in feedback discussions; improved coherence and referencing.
R9	Psychological resilience	Experienced initial anxiety but became motivated after observing progress; engagement increased; revisions clarified arguments.
R10	Discipline and academic responsibility	Recognized high disciplinary demands; consistently participated in learning; continued revising despite limited time.

Note: R = Respondent code

Based on the data presented in Table 1, all participants demonstrated grit in their online writing processes, although its intensity and form varied. Grit was most prominently reflected in perseverance when facing writing difficulties and consistency throughout the revision process, as observed across nearly all participants (R1–R10). Students continued writing despite experiencing confusion about ideas, mental fatigue, time pressure, and critical instructor feedback. Furthermore, the table indicates that revision consistency was the most frequently observed indicator of grit. Most participants completed more than two revisions and actively responded to instructor feedback, addressing not only technical aspects but also the structure of their arguments and textual coherence. This finding suggests that grit plays a crucial role in sustaining academic writing processes in online learning contexts. More importantly, grit was reflected not only in students' persistence, but also in their ability to sustain iterative writing processes despite cognitive complexity and emotional challenges. This highlights grit as a dynamic internal resource that supports long-term engagement in online academic writing.

The data also reveal long-term goal orientation and commitment to writing quality among most participants (R5, R6, R8). Students did not merely focus on task completion but also on enhancing the academic quality of their writing. This commitment was reflected in efforts to seek additional references, deepen arguments, and refine logical flow. Nevertheless, inter-participant variation remained evident, particularly in the ability to withstand emotional pressure. Some participants experienced decreased motivation or anxiety at certain stages (R4,

R9), yet they continued to demonstrate perseverance in completing the writing process. These findings indicate that grit functions as a protective factor that enables students to persist in writing literacy acquisition despite cognitive and emotional challenges.

The Role of Cognitive Ability in Managing the Complexity of Writing Tasks

The findings indicate that students' cognitive abilities play a central role in managing the complexity of online academic writing tasks, particularly in terms of idea planning, argument organization, integration of scholarly sources, and the use of academic language in accordance with scientific conventions. Students are required not only to conceptually understand course materials but also to transform that understanding into logical, coherent, and well-argued academic writing. Most respondents reported that their primary difficulty in writing does not lie in a lack of reading materials, but rather in how ideas are managed and systematically organized. In this context, students with well-developed cognitive strategies demonstrate greater adaptability in responding to complex academic demands.

1. Cognitive Planning in the Writing Process

Students with strong cognitive abilities tend to initiate the writing process through structured planning, such as developing concept maps, outlines, or writing frameworks prior to drafting. This strategy helps students avoid idea confusion and maintain focus throughout the writing process.

One respondent (R1) stated:

"If I start writing without an outline, I get stuck very quickly. That's why I usually create the main points first and then develop them gradually."

A similar perspective was expressed by R4, who emphasized the importance of planning as a strategy for reducing cognitive load:

"With an outline, I know which section should be written first. It doesn't have to be completed all at once, but the direction is clear."

These findings suggest that cognitive planning functions as a navigational tool that enables students to manage the complexity of writing tasks in a gradual and systematic manner.

2. Managing Cognitive Load through Task Segmentation

This study also found that students employ cognitive strategies in the form of task segmentation, whereby writing tasks are divided into smaller, more manageable components, such as writing the background section first, followed by the literature review, and so forth. This strategy reduces mental fatigue and helps maintain consistency in the writing process.

R7 explained:

"I never write an entire article in one sitting. Usually, I write one section per day so that I don't get too mentally exhausted."

Similarly, R10 stated that dividing writing tasks helped maintain persistence despite time constraints:

"As a teacher, my time is limited. So, I work on it gradually little by little, but consistently."

These findings indicate that the ability to manage cognitive load is a crucial factor in sustaining the writing process, particularly in online learning contexts that demand high levels of learner autonomy.

3. Metacognitive Strategies in Monitoring and Evaluating Writing

In addition to basic cognitive strategies, students also used metacognitive strategies, such as monitoring writing progress, evaluating the quality of arguments, and reflecting on weaknesses before submission. Students who actively employ these strategies tend to be more

critical of their own written work.

R3 stated:

"I usually reread my writing several times. If it feels incoherent, I revise it before submitting."

R12 added that self-reflection plays an essential role in learning to write:

"I use the lecturer's comments as evaluation material so that I don't repeat the same mistakes."

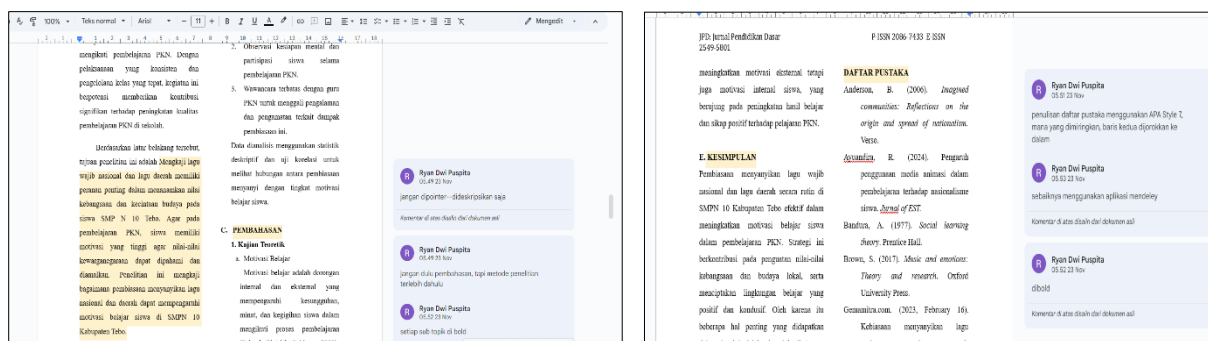


Figure 1. Example of Instructor Feedback Notes

These metacognitive strategies indicate that students do not write mechanically, but instead consciously regulate their thinking processes and the quality of their written output.

4. Cognitive Ability in the Context of Online Learning

In online learning contexts, students' cognitive abilities become increasingly critical due to limited direct interaction with instructors. Students are required to regulate their own learning processes, including determining strategies for understanding course materials and executing them in the form of academic writing. Students who can consciously manage their thinking processes tend to show greater stability in completing writing tasks, even when the task takes a long time. In contrast, students with less mature cognitive strategies are more susceptible to idea confusion, mental fatigue, and procrastination.

R15 reflected:

"Online writing really demands full independence. Without your own thinking strategies, it's easy to give up."

These findings suggest that cognitive ability functions as a strategic regulatory mechanism that enables students to manage the complexity of academic writing tasks in online learning contexts.

The Role of Emotion in Mediating and Moderating the Sustainability of Writing Literacy Acquisition

The findings indicate that emotion plays a significant role as both a mediator and moderator in sustaining the process of online academic writing literacy acquisition among master's students in Primary Education. Emotion does not merely arise in response to academic demands; it also influences how students interpret difficulties, maintain perseverance, and manage cognitive strategies throughout the writing process. The analysis revealed three main subthemes: emotion as a mediator between grit and writing sustainability, emotion as a moderator of the effectiveness of cognitive strategies, and emotion regulation as a key determinant of sustainable writing literacy acquisition.

(1) Emotion as a Mediator between Grit and Writing Sustainability

The findings demonstrate that emotion functions as a mediating mechanism linking students' perseverance (grit) to the sustainability of their writing activities. Students with high levels of grit do not necessarily persist in the writing process when negative emotions are poorly regulated. Conversely, when students can generate or maintain positive emotions, their perseverance becomes more effective. Most respondents reported that positive emotions, such as satisfaction when ideas are well organized, increased confidence after receiving constructive feedback, and pride in writing progress, motivated them to continue writing.

R2 stated:

"After completing one section and feeling that the writing is more organized, a sense of satisfaction emerges and motivates me to continue with the next section."

R6 added:

"At first I felt exhausted, but after receiving appreciation from the lecturer, my confidence increased and I became more motivated to revise my writing more seriously."

These findings indicate that positive emotions mediate the relationship between grit and writing sustainability by reinforcing the perceived value of effort.

(2) Negative Emotion as Both an Obstacle and a Catalyst for Reflection

In addition to positive emotions, students also experienced various negative emotions, including academic anxiety, fear of making mistakes, frustration due to multiple revisions, and emotional exhaustion resulting from sustained online academic demands. These negative emotions have the potential to hinder the writing process, particularly in the absence of adequate emotion regulation.

R5 stated:

"Sometimes I'm afraid that my writing is completely wrong, so I end up postponing continuing."

R9 shared a similar experience:

"When there are too many comments, I feel exhausted and want to stop writing for a while."

However, this study also found that for some students, negative emotions served as catalysts for reflection and improvement. When students were able to interpret criticism as part of the learning process, negative emotions were transformed into motivation to enhance writing quality.

R11 explained:

"At first it hurt, but after reflecting on it, the lecturer's comments actually helped me see the weaknesses in my writing."

(3) Emotion as a Moderator of Cognitive Strategy Effectiveness

The findings further indicate that emotion functions as a moderator by influencing the extent to which students' cognitive strategies operate effectively. Students with well-developed cognitive strategies still encountered difficulties when experiencing intense negative emotional states, such as prolonged stress or excessive anxiety.

R3 explained:

"Even though I already have an outline, when I'm stressed it's still difficult to express my ideas.."

Conversely, students who were in positive or emotionally stable states tended to apply their cognitive strategies more effectively.

R8 stated:

“When my mind is calm, it’s easier to organize the flow of writing and focus on the arguments.”

Thus, emotion moderates the relationship between cognitive ability and writing success by either strengthening or weakening the effectiveness of the strategies employed.

(4) Emotion Regulation as a Determinant of Sustainable Writing Literacy Acquisition

Another important aspect emerging from the data is students’ emotion regulation ability. Students who can recognize, manage, and adjust their emotional responses demonstrate greater resilience in sustaining long-term academic writing processes.

R13 stated:

“When I start to feel bored, I take a short break and then continue. It’s better than forcing myself when nothing is working.”

R15 added:

“I’ve learned to accept that writing is a process, so I don’t blame myself too much.”

This capacity for emotion regulation enables students to maintain engagement in the writing process despite academic pressure and time constraints. These results confirm that emotion plays a regulatory role in shaping students’ engagement, acting as both a mediator and moderator in the sustainability of the writing process.

The findings indicate that grit plays a significant role in sustaining students’ engagement in the academic writing process, particularly in online learning contexts that demand a high level of learner autonomy. Students’ perseverance in confronting writing difficulties, including completing repeated revisions and seeking additional references, reflects the core characteristics of grit as long-term resilience toward academic goals. Contemporary research conceptualizes grit as a dynamic construct associated with sustained cognitive engagement and long-term academic persistence rather than merely a stable personality trait (Demir, 2024; Li et al., 2025). In higher education, grit has been empirically linked to sustained academic engagement, goal commitment, and adaptive responses to learning challenges, particularly in self-directed environments (Paradowski & Jelińska, 2024; Luan et al., 2025). The students in this study did not abandon the writing process when they encountered difficulties; instead, they maintained iterative revisions and continued refining their arguments despite initial shortcomings. Moreover, recent findings indicate that grit operates in close interaction with self-regulated learning processes, enabling students to sustain effort in cognitively demanding tasks that involve delayed rewards and repeated setbacks (Allen et al., 2021; Namaziandost & Rezai, 2024). In online learning environments characterized by limited external monitoring, grit becomes an internal regulatory mechanism that sustains long-term writing goals and engagement (Paradowski & Jelińska, 2024).

Students’ cognitive abilities were also found to play a crucial role in managing the complexity of academic writing tasks (Wang et al., 2025), particularly in planning ideas, organizing arguments, and integrating scholarly sources. Recent research on cognition and writing emphasizes that academic writing is a recursive and cognitively demanding process involving planning, translating, reviewing, and revising under conditions of constrained working memory and attentional resources (Stephens et al., 2020; Freeborn et al., 2023b). In digitally mediated learning environments, these cognitive demands intensify due to increased cognitive load and the need for independent strategy regulation (Ludewig et al., 2025). Empirical studies further suggest that cognitive engagement in online learning is strongly associated with students’ ability to manage task complexity through structured planning and metacognitive monitoring (Luan et al., 2025). However, the present findings demonstrate that cognitive strategies cannot always function optimally under conditions of emotional instability, reinforcing recent evidence that cognitive performance in academic writing is closely

intertwined with affective regulation (Namaziandost & Rezai, 2024). Thus, writing literacy acquisition in online higher education reflects an integrated system in which cognitive capacity, self-regulation, and motivational persistence interact dynamically.

The findings further reveal that positive emotions, such as self-confidence and satisfaction with writing progress, function as mediators that strengthen the relationship between grit and the sustainability of the writing process. Students who experience positive academic emotions tend to demonstrate higher levels of cognitive engagement and sustained effort when completing complex writing tasks (Li, et al., 2023; Wu, et al., 2023). Recent studies in higher education contexts indicate that enjoyment, confidence, and academic pride significantly predict deeper learning engagement and persistence in online environments (Wang et al., 2024). Positive emotions enhance students' willingness to invest cognitive resources, particularly in tasks requiring iterative revision and reflective thinking. Furthermore, contemporary research on emotion regulation emphasizes that learners' ability to regulate affective responses plays a crucial role in maintaining engagement in cognitively demanding academic tasks.

These findings are in line with those of Cheng & Tsai (2020) who demonstrated that negative emotions can reduce writing performance by inhibiting reflective and evaluative thinking processes. In online learning contexts, Jin & Jue (2026) further assert that academic emotions are closely associated with students' self-regulation and learning engagement. Accordingly, students' emotional states are critical in determining the extent to which cognitive abilities can be used effectively in the writing process. Overall, the findings indicate that grit, cognitive ability, and emotion form an integrated system in writing literacy acquisition (Jin & Jue, 2026; Li & Jun, 2026). Grit provides a foundation for long-term resilience, cognitive ability serves as a mechanism for managing task complexity, and emotion regulates the intensity and sustainability of students' engagement (Zhang, 2026; Guo et al., 2025).

These findings reinforce the view that writing instruction in higher education, particularly in online learning contexts, should be designed holistically by simultaneously considering cognitive and affective dimensions. Instructional approaches that emphasize cognitive aspects alone, without attending to grit and emotion regulation, risk producing unsustainable engagement in academic writing. In practical terms, these findings suggest that online writing instruction should move beyond product-oriented approaches toward process-oriented and psychologically informed designs. Educators are encouraged to integrate structured scaffolding, iterative feedback cycles, and emotional support mechanisms to sustain students' engagement. Additionally, embedding reflective activities and goal-setting strategies may help strengthen students' grit, while timely feedback can foster positive academic emotions and reduce anxiety.

CONCLUSION

This study demonstrates that writing literacy acquisition in online learning is shaped by the dynamic interaction of grit, cognitive ability, and emotion. Grit sustains persistence, cognitive ability supports the management of task complexity, and emotion regulates engagement. The main contribution of this study lies in proposing an integrative psychopedagogical perspective, emphasizing that effective writing instruction must address cognitive and non-cognitive dimensions simultaneously. Future research should examine this integrative model using mixed-methods or experimental designs to strengthen generalizability of the findings.

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