**International Journal of Education and Practice**
*2026 Vol. 14, No. 1, pp. 270-285*
*ISSN(e): 2310-3868*
*ISSN(p): 2311-6897*
*DOI: 10.18488/61.v14i1.4697*


# Impact of a metacognitive-based writerpreneur e-platform on essay writing skills, metacognitive awareness, and literacy entrepreneurship

**Raden Ika Mustika**[1+]
**Reka Yuda Mahardika**[2]
**Dede Endang Mascita**[3]
**Emi Kulsum**[4]

[1,2]*Department of Indonesian Language Education, IKIP Siliwangi, Bandung, Indonesia.*
[1]*Email: mestikasaja@ikipsiliwangi.ac.id*
[2]*Email: rekayuda@ikipsiliwangi.ac.id*
[3]*Department of Indonesian Language and Literature Education, Universitas Swadaya Gunung Jati, Cirebon, Indonesia.*
[3]*Email: dedenmas68@gmail.com*
[4]*Indonesian Language Teacher, State Junior High School 1 Ngamprah, Bandung, Indonesia.*
[4]*Email: emikulsum041@guru.smp.belajar.id*

*(+ Corresponding author)*

**Article History**
Received: 10 October 2025
Revised: 4 December 2025
Accepted: 7 January 2026
Published: 13 January 2026

**Keywords**
E-platform writerpreneur
Essay writing ability
Literacy entrepreneurial motivation
Metacognitive awareness.

## ABSTRACT

This study aims to investigate the impact of a metacognition-based writerpreneur e-platform on essay writing skills, metacognitive awareness, and literacy entrepreneurship. The research method used in this study was a quasi-experimental study involving 256 students from three universities. Participants were divided into two equal groups: the experimental group, which received the metacognitive-based writerpreneur e-platform, and the control group, which received conventional writing instruction. Data analysis using ANCOVA, correlation analysis, and chi-square test was conducted to investigate the impact of interventions on academic writing skills. The results showed that the group receiving the metacognitive-based writerpreneur e-platform in writing learning improved essay writing skills, metacognitive awareness, and literacy entrepreneurship more effectively than traditional writing instruction. Improved essay writing skills were evident in the quality of the writing, which met several aspects, including task achievement, cohesion, coherence, grammatical range and accuracy, and lexicon. Furthermore, a metacognitive approach significantly contributes to students' essay writing skills. The metacognitive dimensions found to be correlated and contributing to essay writing skills are declarative, procedural, and conditional knowledge, planning, monitoring, and evaluation, information management strategies, and debugging strategies. Furthermore, the metacognitive-based writerpreneur e-platform can enhance literacy entrepreneurship motivation. Therefore, the metacognitive-based writerpreneur e-platform not only improves students' essay writing skills but also increases their interest in literacy entrepreneurship. This research implies that integrating technology into writing instruction can help teachers optimize students' writing skills and entrepreneurial potential.

**Contribution/Originality:** This study contributes to instructional design by utilizing a Metacognitive-Based Writer e-Platform to improve essay writing skills, metacognitive awareness, and literacy entrepreneurship. The originality of this study lies in the use of a Metacognitive-Based Writer e-Platform that can not only enhance writing skills but also promote literacy entrepreneurship.

## 1. INTRODUCTION

Writing skills require not only mastery of language and grammar but also mastery of the writing discipline. Current academic writing instruction is product-oriented (Gidh-Jain, Parke, König, Spiertz, & Mesenbrink, 2024;

Pan, Zhang, Zou, Li, & Yang, 2023). This leads students to do everything to achieve the product without engaging in the writing process. This phenomenon disengages students from engaging in the writing process, resulting in a lack of self-regulation in academic writing (Calderon & Herrera, 2025; Norén, Melander Bowden, & Evaldsson, 2022). It is challenging for many students to convert their cognitive abilities into academic ones because they lack the drive and behavioral skills necessary to transform their information into written products (Highland & Fedtke, 2023; Ma et al., 2025). One important factor in determining students' academic writing talents is their ability to self-regulate when writing. Students' inability to control their own behavior indicates that metacognitive techniques are necessary to develop strong writing abilities (Banaruee, Khatin-Zadeh, & Ruegg, 2018). Based on this explanation, the writerpreneur e-platform, integrated with a metacognitive approach, is an alternative learning medium that not only improves essay writing skills through metacognitive strategies but also instills entrepreneurial values in writing.

Technological developments in language learning currently focus on improving the quality of the writing learning process because writing skills are a crucial skill in secondary and tertiary education (Khuder & Negretti, 2025; Pletcher, Williams, & Shaikh, 2025). Several technologies exist in various forms, such as platforms, websites, applications, and one form of AI. The use of various electronic platforms in the learning process is currently increasing due to the benefits and competencies they produce, which are becoming better and more effective. One example is the use of various writing platforms (Jongsma, Meeter, van Muijlwijk-Koezen, & Scholten, 2025; Villabona & Villalón Molina, 2023). Both AI and platform technologies are the most frequently used in writing learning. The Writerpreneur e-platform is an online platform used in writing learning that facilitates students in improving their writing skills, developing metacognitive awareness, and encouraging learners to become independent and productive writers through various features that promote collaborative and reflective processes (Conijn et al., 2022; Qualter, 2024). Through this platform, students can receive and provide feedback and comments to improve the quality of their writing. Students can submit their writing to the Writerpreneur e-platform and receive feedback from instructors or other students, focusing on aspects of cohesion and coherence, lexicon, and grammatical range and accuracy (Heeks, 2022; Kim, Yu, Detrick, & Li, 2025). The Writerpreneur e-platform is more standardized and consistent across all types of writing compared to human assessment.

The writerpreneur e-platform is anticipated to enhance students' essay writing abilities and give them the chance to turn their written work into a profitable venture. Corrective feedback platforms have been the subject of numerous prior studies, and the findings of these studies have demonstrated their efficacy in enhancing students' essay writing abilities (Gao, Hashim, & Md Yunus, 2025; Jin, 2025). Another study investigated the impact of a web wiki writing platform, which showed that web wikis can improve students' writing skills and the quality of their scientific papers (Alharbi & Albelihi, 2023; Rafi & Amjad, 2025). Furthermore, another study has shown that Web 2.0 platforms are effective in improving students' academic writing skills (Zheng & Zhang, 2025). However, previous studies have not yet optimally investigated the impact of the writerpreneur e-platform and its online dimensional features. The impact of the writerpreneur e-platform on academic essay writing abilities is the subject of this innovative study, which focuses on elements that can enhance student writing quality, such as task accomplishment, cohesion and coherence, range, and grammatical precision. Furthermore, the writerpreneur e-platform in this study is integrated with metacognitive strategies (planning, monitoring, and self-evaluation in writing). Students' writing abilities are thought to be greatly influenced by behavioral (application, revision), cognitive (attention and understanding), and emotional (positive or negative evaluations) elements of their involvement in the learning process. Insufficient research has been conducted. It is thought that the new study's findings will have a greater impact on literacy entrepreneurship, metacognitive awareness, and essay writing abilities. Based on this explanation, the researcher formulated several research questions, as follows.

a) What is the impact of a metacognitive-based writerpreneur e-platform on essay writing skills?
b) What is the impact of a metacognitive-based writerpreneur e-platform on metacognitive skills?
c) What is the impact of a metacognitive-based writerpreneur e-platform on literacy entrepreneurship?

## 2. THEORETICAL REVIEW

### *2.1. Metacognition, Self-Regulation, and Writing Skills*

Metacognition is synonymous with an individual's ability to self-regulate learning, also known as self-regulated learning (SRL) (Chen, Chai, & Jong, 2023; Tate et al., 2025). Three facets of regulation, personal, behavioral, and environmental, are used by SRL in its implementation. The ability to anticipate anxiety during the learning process by using cognitive and affective methods is known as self-regulation. Additionally, self-regulation includes a person's flexible application of personal motor skills techniques (Ajabshir & Ebadi, 2023; Wang & Wang, 2025). The adaptive capacity to employ task-specific techniques is necessary for self-regulation. Strong metacognitive abilities are demonstrated by the ability to strategically govern each of the three regulatory domains. SRL encompasses several components: personal, environmental, and behavioral processes, which facilitate students' understanding, goal-setting, strategy use, evaluation, and appropriate strategy modification to optimally understand learning materials (Kieslich, Diakopoulos, & Helberger, 2025). People who possess high self-regulation abilities can regulate and maximize their own potential as well as the surroundings to help their learning process by using a variety of metacognitive techniques. When it comes to learning, these individuals can make the most of both their internal and external resources (Ebrahimi & Ebadi, 2024; Shulgina, Costley, Shcheglova, Zhang, & Sedova, 2024). Therefore, the ability of a student to plan, monitor, and manage their learning capacities by maximizing their thoughts, feelings, and behaviors can be characterized as self-regulation of learning. Additionally, it is thought that self-regulation (SRL) techniques enhance behavioral, motivational, metacognitive, and cognitive regulation (Biju, Abdelrasheed, Bakiyeva, Prasad, & Jember, 2024; Peungcharoenkun & Waluyo, 2023). Students who possess strong cognitive strategy skills will be able to utilize these strategies to become independent and effective learners, independent of the instructor's strategies and control.

Through this study, researchers elaborate on how an integrated writerpreneur e-platform with metacognitive writing strategies contributes to academic writing skills. The writing process involves several stages: planning, translating ideas into text, and transcription, which includes evaluation and revision (Mohammed & Khalid, 2025). There are two knowledge translation strategies in the cognitive model: rhetorical strategies and self-regulation strategies (French, 2020; Sanchez, Norka, Corbin, & Peters, 2019). This model provides additional knowledge and information to support the cognitive process during writing. This cognitive process determines the difference between the writing skills of novice and skilled writers. This difference in ability is determined through strategies of use, interpretation, review, and monitoring. Skilled writers are indeed proficient in using their cognitive abilities to generate and filter experiences and stimulate their motivation to write (Hancock & Karakok, 2021; Keith, Stives, Kerr, & Kastner, 2020). This differs from novice writers who are not yet proficient in writing strategies such as planning, goal setting, evaluation, and revision of their texts. Therefore, writing ability is a language skill controlled by the writer themselves, using their own resources to produce quality text. If a writer possesses good metacognitive strategies, they will be able to control the effects of the triadic process in the writing process. This metacognition encompasses all writing processes.

Students can write more effectively when they use this metacognitive technique. Numerous earlier studies have verified that self-regulation and metacognition enhance students' writing quality (Alfaifi, 2022; Toprak & Yücel, 2020). Metacognition-based instruction affects students' academic writing abilities and improves the quality of their work. This metacognitive technique can enhance students' attitudes and perceptions about writing and maximize their engagement in the writing process, both individually and cooperatively, according to other research in the context of second language learning (Davies & Greenwood, 2020; Dirrigl Jr & Noe, 2019). These results support the hypothesis that students' self-efficacy views are correlated with metacognitive writing techniques. Students who are proficient in language will benefit from increased metacognition and writing skills (Li & Hebert, 2024; Pan et al., 2023). Prior research showed that this metacognitive technique includes self-awareness and feedback assistance (Calderon & Herrera, 2025; Highland & Fedtke, 2023). A study examining the impact of metacognition on writing

quality was conducted in Korea with 200 students. According to the study, pupils who possess metacognitive awareness are better able to manage their writing abilities and maintain high levels of control when writing (Banaruee et al., 2018; Ma et al., 2025). As a result, students who possess metacognitive awareness are able to retain the highest quality of writing throughout the entire process, from planning to final revision.

### *2.2. Writerpreneur E-Platform*

The Writerpreneur e-platform serves as a scaffolding tool for giving students constructive criticism so that their writing improves. It is used in the writing learning process to help students address issues related to aspects that can improve writing quality, such as grammar, punctuation, spelling, and conventions, and provides time to revise their writing (Khuder & Negretti, 2025; Pletcher et al., 2025). Students also receive accurate and consistent metalinguistic explanations, which can facilitate student improvement in writing accuracy and help teachers anticipate limited time. Various features available within the platform include learning modules, self-reflection spaces, digital portfolios, peer review feedback, a Writerpreneur Zone, monitoring, and evaluation (Jongsma et al., 2025; Villabona & Villalón Molina, 2023). The feedback feature can help students focus more on errors, allowing for effective improvement. Furthermore, the Writerpreneur Zone facilitates students' ability to sell their writing, thereby increasing their motivation for literacy entrepreneurship. Several previous studies have investigated various writing learning platforms (Conijn et al., 2022; Qualter, 2024). One study demonstrated that automated feedback using the online platform significantly improved essay writing skills in terms of idea organization and grammar usage (Jin, 2025; Kim, Lee, Cao, & Cho, 2025). Furthermore, another study revealed that the Write & Improve online platform accurately diagnoses students' writing skills according to the Common European Framework of Reference (CEFR) and facilitates students' ability to complete essay, report, and argument writing assignments with high quality (Gao et al., 2025; Rafi & Amjad, 2025).

Furthermore, another study revealed that the online platform significantly contributes to grammatical accuracy and other dimensions of writing performance, such as task achievement, cohesion and coherence, and vocabulary, as well as student active participation (Guyer, Stewart, Khalifa, Pham, & Saad, 2024). Furthermore, the CorrectEnglish online platform has proven effective in improving students' essay writing skills in terms of grammar, writing style, and word usage. Students' writing is evaluated on this platform based on its content, organization, style, focus, and general writing proficiency. Additionally, a different earlier study looked at how well automated corrective feedback affected the ability to write argumentative essays. The study's findings suggest that receiving constructive criticism can enhance the structure and grammar of argumentative essay writing (Chen et al., 2023; Tate et al., 2025). This study differs from previous studies; the current study focuses on academic writing skills by paying attention to aspects of task achievement, cohesion and coherence, lexicon, and range, as well as grammatical accuracy, which can improve the quality of students' writing. In addition, this study also investigates aspects of student engagement in the learning process, which include behavior (application, improvement), cognitive (attention and understanding), and affective (positive or negative perception), which are believed to contribute significantly to writing skills.

## 3. METHOD

### *3.1. Research Design*

This study employed a quasi-experimental research method to examine the writerpreneur e-platform based on a metacognitive approach for enhancing essay writing abilities, metacognitive awareness, and motivation for literacy entrepreneurship. The study involved 256 students from three universities: IKIP Siliwangi, UNSWAGATI Cirebon, and UNSAP Sumedang, West Java, Indonesia. Participants were divided into two groups: the experimental group received the metacognitive approach-based writerpreneur e-platform intervention, and the control group received a conventional writing learning method. The experimental group is also referred to as the electronic class, while the control group is referred to as the non-electronic class. Writing assessments were conducted in the pretest and

posttest phases for both groups. Participants were university students aged 20-25 years, with a gender composition of 60% female and 40% male. The sample was randomly selected and divided into two groups, each comprising 128 students. Random assignment was used to reduce potential bias and enhance the reliability and validity of the findings. To ensure homogeneity of the data across participants, a pretest was conducted to identify initial variations. The analysis revealed no initial differences in writing competency between the two groups.

### *3.2. Research Instrument*

#### *3.2.1. Essay Writing Task*

Writing ability was evaluated through essay writing tasks 1 and 2 in both groups. These two types of tasks were presented in essay format and assessed using the CEFR writing descriptors. The evaluation was conducted in four aspects: task achievement (decomposition of main points, the presence of an overview, factual data, and word count meeting criteria), cohesion and coherence (organization of ideas, paragraph format, and conjunctions), lexicon (use of terminology, collocations, and sentence structure), and grammatical range and accuracy (use of grammar, punctuation, and errors). Each aspect of the assessment was scored from 1 to 9 points. In the task achievement aspect, a score of 9 indicates the task is met by presenting a claim and expanding it with various ideas and supporting it with data. In the cohesion and coherence aspect, a score of 9 indicates the correct and effective use of cohesive devices and structures. In the lexical aspect, a score of 9 indicates the use of appropriate vocabulary and the incorporation of appropriate idioms. In terms of grammatical range and accuracy, a score of 9 demonstrates the use of flexible structures and minimal errors that do not interfere with comprehension. Each student's academic writing ability was assessed by the instructor, with 40% of the academic writing assignment and 60% of the academic writing assignment 2. The final grade was taken from the sum of both writing assignments, with scores varying from 1 to 9 in multiples of 0.5. Interrater agreement was established to minimize subjectivity in the assessment. The analysis found that both assessors met the criteria with a score of ($r = 0.84$).

#### *3.2.2. Stimulated Recall*

To assess students' behavioral, cognitive, and affective aspects during the writing learning process using the writerpreneur e-platform based on a metacognitive approach, the assessors employed a stimulated recall technique. This technique was administered to 10 participants from the experimental class, selected to represent a range of scores low, medium, and high on the posttest. The procedure adhered to research ethics involving human participants. Prior to the stimulated recall sessions, students received a consent form to ensure voluntary participation. Participants' identities remained anonymous, and data were used solely for research purposes. Student activities during the learning process were recorded via screen capture, and follow-up interviews were also recorded and analyzed to ensure data accuracy. Before the interviews, students watched video recordings of themselves working on their writing and received online feedback aimed at improving their writing skills. They were instructed to recall behavioral, cognitive, and affective aspects that emerged during the process. Specific questions, such as "Why did you accept and use the corrective feedback?" and "Why didn't you accept the feedback and apply it?" were used to uncover these aspects, providing insights into students' ideas and motivations in writing. The study also included screen recordings of students interacting with an online entrepreneur e-platform to aid their memory of the activities during the learning process. The 60-minute interviews were transcribed for data analysis. To enhance validity and reliability, the interview results were returned to the students through member checking, allowing participants to verify the accuracy of the data. At the end of the session, students had the opportunity to ask questions about the learning process.

#### *3.2.3. Assessment of Literacy Entrepreneurial Motivation*

Literacy entrepreneurial motivation was evaluated using the Entrepreneurial Motivation Questionnaire from Wigfield and Guthrie (1995). This measure has strong psychometric properties and is widely recognized. It is also capable of effectively assessing the construct of literacy entrepreneurial motivation. This instrument was used in the pre-test and post-test phases.

#### *3.2.4. Interviews*

Student representatives in the experimental group were interviewed one-on-one to learn about their attitudes and beliefs regarding the efficacy of using the metacognitive-based Writerpreneur e-platform. In the posttest phase, students were asked to explain how their writing had improved. Researchers discovered elements of writing abilities that were impacted by the Writerpreneur e-platform, which is based on metacognition. To ensure consistency and coherence, the same subjects from the prior session were interviewed utilizing a stimulated recall technique. Gaining a thorough understanding of the behavioral, cognitive, and affective elements involved in the learning process was another goal of these interviews. Additionally, interviews reduced the possibility of unrelated factors influencing the data.

### *3.3. Procedure*

#### *3.3.1. Writing Class Using the Writerpreneur E-Platform Based on a Metacognitive Approach*

Learning in the experimental group, also known as the e-class, was conducted through several stages. Students were given a writing topic to plan their writing, using various strategies, such as writing on a predetermined topic and engaging in discussions with other students during the pre-writing stage. Students completed their drafts and submitted them to the instructor for feedback on key issues in essay writing. The instructor highlighted key writing issues, including task achievement, cohesion and coherence, and organization. The next stage was collaborative revision, where students discussed, provided suggestions, and made decisions based on the feedback. This collaborative revision process aimed to enhance their understanding of writing strategies and conventions. Students revised their essays based on the collaborative revision discussion and then posted their work on the Writerpreneur e-platform. The final stage was an individual revision phase based on feedback received from the Writerpreneur e-platform, using a metacognitive approach, covering grammar, punctuation, spelling, and other issues. At the end of each writing assignment, the instructor evaluated the final essays using descriptors to analyze their writing. This integration of collaborative and individual revision aims to comprehensively improve the quality of students' writing across various aspects. This collaborative revision process is an integral part of the collaborative learning environment to enhance student writing. It involves several stages and includes students and instructors, providing feedback and encouraging active student participation in improving the quality of their writing.

#### *3.3.2. Writing Class Using Conventional Writing Learning Methods*

Academic writing instruction on the same topic was also conducted in the control group. In this conventional classroom, students went through the following phases: During the pre-writing phase, students finished their essay's first draft and sent it to the researcher for comments on important writing elements. Students were instructed to write a second draft and submit it to the instructor for manual evaluation after making revisions to important writing elements. Students created a final draft of their essays after making revisions in response to feedback from the instructor. The teacher graded every writing task using CEFR descriptors, same as in the experimental class. Two sessions a week for a semester were used to administer the intervention to both groups. Five group writing projects were given during each 100-minute session.

### *3.4. Data Analysis*

The Kolmogorov-Smirnov test was carried out in the pretest and posttest phases to verify data normality. The results showed that data for both groups are normally distributed. Furthermore, the one-way ANCOVA parametric test was used to compare the writing skills of the two groups, considering aspects such as task achievement, coherence and cohesion, lexicon, and the accuracy and reach of grammar. In addition, a correlation test was conducted to investigate the relationship between metacognition aspects and essay writing ability, and chi-square tests were used to analyze the impact of intervention on literacy entrepreneurship motivation.

### *3.5. Ethical Considerations*

All students participating in the study participated voluntarily. All participants were asked to complete a consent form. This study received permission from IKIP Siliwangi and several participating universities, including UNSWAGATI Cirebon and UNSAP Sumedang. This study was also approved by the Institutional Review Board of IKIP Siliwangi, Indonesia, with protocol number Ref. No. 035/IKIP-Slw/LPPM/VI/2025, dated June 4, 2025. All research data was anonymized to protect participant confidentiality.

## 4. RESULTS

### *4.1. Impact of a Metacognitive-Based Writerpreneur E-Platform on Essay Writing Skills*

Descriptive statistical methods were employed to evaluate the mean scores during the pretest and posttest stages of essay writing abilities. Every element that contributes to writing quality was examined, including vocabulary, task completion, coherence and cohesiveness, grammatical variation, and precision in both groups. The results of the analysis are shown in Table 1. According to the research, the pretest results for both groups demonstrated similar writing skills in terms of vocabulary, grammatical variety, clarity, coherence, cohesiveness, and task achievement. The experimental group (electronic class) outperformed the control group (non-electronic class) in the posttest phase. To investigate significant variations in improving each aspect of writing skills between the experimental and control groups, a one-way ANCOVA analysis was used. After controlling for pretest scores, Table 2 presents the results of the ANCOVA analysis pertaining to the two groups' overall writing skills. The analysis revealed a significant difference between the two groups' posttest results. The experimental group's score of $[F(1, 65) = 52.45, p < 0.001, \eta p^2 = 0.50]$ demonstrated that they were better writers than the control group.

**Table 1.** Results of descriptive statistical analysis of the pretest and posttest phases.

| Writing Aspect | Group | N | Mean | Std. deviation | Std. error mean |
|---|---|---|---|---|---|
| Pre-writing performance | Experiment | 128 | 6.52 | 0.79 | 0.22 |
| | Control | 128 | 5.42 | 0. 80 | 0.21 |
| Post-writing performance | Experiment | 128 | 8.45 | 1.23 | 0.22 |
| | Control | 128 | 6.31 | 1.05 | 0.21 |
| Pre-task achievement | Experiment | 128 | 5.24 | 0.67 | 0.16 |
| | Control | 128 | 5.46 | 0.70 | 0.17 |
| Post-task achievement | Experiment | 128 | 7.35 | 1.42 | 0.27 |
| | Control | 128 | 5.67 | 1.12 | 0.23 |
| Pre-coherence and cohesion | Experiment | 128 | 5.12 | 0.80 | 0.16 |
| | Control | 128 | 5.02 | 0.84 | 0.18 |
| Post-coherence and cohesion | Experiment | 128 | 7.38 | 0.82 | 0.15 |
| | Control | 128 | 5.48 | 1.10 | 0.25 |
| Pre-lexicon | Experiment | 128 | 5.35 | 1.07 | 0.22 |
| | Control | 128 | 5.23 | 1.32 | 0.29 |
| Post-lexicon | Experiment | 128 | 8.50 | 1.04 | 0.21 |
| | Control | 128 | 6.24 | 1.52 | 0.30 |
| Pre-grammatical range and accuracy | Experiment | 128 | 5.42 | 0.76 | 0.14 |
| | Control | 128 | 5.30 | 0.82 | 0.18 |
| Post-grammatical range and accuracy | Experiment | 128 | 8.24 | 1.42 | 0.25 |
| | Control | 128 | 6.21 | 1.10 | 0.23 |

**Table 2.** Results of ANCOVA analysis of differences in writing ability of the two groups.

| Source | Type III sum of squares | df | Mean square | F | Sig. | Partial Eta squared |
|---|---|---|---|---|---|---|
| Pre-writing performance (Covariates) | 47.12 | 1 | 47.12 | 172.24 | 0.00 | 0.92 |
| Groups | 15.53 | 1 | 15.53 | 52.45 | 0.00 | 0.48 |

Furthermore, starting with the task performance component of the two groups, a one-way ANCOVA analysis was performed to examine variations in writing skills across all elements. Table 3 displays the findings of the study of the task achievement component after pretest scores were taken into account. With a value of [$F(1, 55) = 5.73$, $p < 0.05$, $\eta p^2 = 0.08$], the analysis revealed a significant difference between the posttest scores for the task achievement component in both groups. This figure shows that the experimental group outperformed the control group in terms of writing proficiency on the task achievement component. Additionally, a one-way ANCOVA test was used to examine variations in writing proficiency in the areas of coherence and cohesiveness. Table 4 displays the findings of the ANCOVA analysis on the cohesiveness and coherence features after adjusting for the pretest scores. With a value of [$F(1, 65) = 1.65$, $p < 0.25$, $\eta p^2 = 0.04$], the analysis revealed no discernible difference in the posttest results for the cohesiveness and coherence aspects in the two groups.

**Table 3.** Results of ANCOVA analysis of writing quality on the task achievement aspect of the two groups.

| Source | Type III sum of squares | df | Mean square | F | Sig. | Partial Eta squared |
|---|---|---|---|---|---|---|
| Pre-task achievement (Covariates) | 11.76 | 1 | 11.93 | 9.56 | 0.00 | 0.15 |
| Groups | 6.83 | 1 | 6.84 | 5.73 | 0.07 | 0.08 |

**Table 4.** Results of ANCOVA analysis of writing quality in terms of cohesion and coherence aspects of the two groups.

| Source | Type III sum of squares | df | Mean square | F | Sig. | Partial Eta squared |
|---|---|---|---|---|---|---|
| Pre-coherence and cohesion (Covariates) | 33.52 | 1 | 33.52 | 132.82 | 0.00 | 0.83 |
| Groups | 0.42 | 1 | 0.42 | 1.65 | 0.42 | 0.04 |

A one-way ANCOVA was performed to examine variations in writing skills concerning the lexicon element between the two groups in the posttest phase. Table 5 displays the results of the analysis. The analysis revealed no notable differences in the posttest scores regarding the lexicon for both groups, showing a value of [$F(1, 55) = 0.62$, $p < 0.50$, $\eta p^2 = 0.00$]. This outcome verifies that the vocabulary aspect of both groups demonstrated comparable enhancement. A one-way ANCOVA test was ultimately performed to examine variations in writing skills regarding range and grammatical precision between the two groups, utilizing pretest scores, as shown in Table 6. The results of the analysis indicated a notable difference in posttest scores concerning range and grammatical accuracy, with a value of [$F(1, 55) = 60.25$, $p < 0.00$, $\eta p^2 = 0.70$]. This outcome verifies that the experimental group, referred to as the electronic class, exhibited superior writing skills in every aspect compared to the control group, known as the non-electronic class.

**Table 5.** Results of ANCOVA analysis of differences in writing quality in terms of lexicon aspects of the two groups.

| Source | Type III sum of squares | df | Mean square | F | Sig. | Partial eta squared |
|---|---|---|---|---|---|---|
| Pre-lexicon (Covariates) | 30.24 | 1 | 30.24 | 29.35 | 0.00 | 0.52 |
| Groups | 0.62 | 1 | 0.62 | 0.50 | 0.62 | 0.00 |

**Table 6.** Results of ANCOVA analysis of differences in writing quality in terms of range and grammatical accuracy for the two groups.

| Source | Type III sum of squares | df | Mean square | F | Sig. | Partial Eta squared |
|---|---|---|---|---|---|---|
| Pre-grammatical range and accuracy (Covariates) | 30.65 | 1 | 30.65 | 41.06 | 0.00 | 0.53 |
| Groups | 49.23 | 1 | 51.35 | 60.25 | 0.00 | 0.70 |

Next, a cognitive engagement analysis was conducted to obtain an overview of students' understanding of using the Writerpreneur e-platform based on a metacognitive approach to improve their writing skills. The analysis included students' cognitive processes in receiving feedback and deciding on appropriate improvements, as well as their metacognitive processes in managing their mental state. Student response excerpts that demonstrated their ease in recognizing feedback and input received from the platform due to writing errors were highlighted. Understanding the causes of errors provided by the Writerpreneur e-platform facilitated students' corrections. This process demonstrates cognitive engagement in the use of the Writerpreneur e-platform, particularly in the areas of attention and understanding. However, some participants also decided not to change their writing. Students' cognitive-behavioral responses are presented in Table 7, reflecting feedback from the Writerpreneur e-platform.

**Table 7.** All learners' behavioral engagement with the e-platform entrepreneur.

| Error | E-platform Entrepreneur Frequency | Accurate e-platform entrepreneur | | Inaccurate e-platform entrepreneur | |
|---|---|---|---|---|---|
| | | Accept | Reject | Accept | Reject |
| Time Adverbs | 8 | 6 | 1 | 1 | |
| Verbs | 16 | 8 | 1 | 6 | 1 |
| Subject-verb agreement | 12 | 6 | 1 | 5 | 1 |
| Diction | 10 | 7 | 1 | 4 | 1 |
| Articles | 37 | 13 | 4 | 14 | 1 |
| Sentences | 16 | 7 | 1 | 5 | 1 |
| Active/Passive verbs | 6 | 4 | 1 | 3 | |
| Clauses | 11 | 8 | 1 | 3 | 1 |
| Spelling | 23 | 16 | 1 | 2 | 1 |
| Punctuation | 13 | 10 | 1 | 1 | |
| Prepositions | 10 | 9 | | 1 | |
| Writing conventions | 18 | 14 | 1 | 2 | 1 |
| Total number of errors | 180 | 88 | 18 | 43 | 17 |
| Percentage | 100% | 57.73% | 12.3% | 25.82% | 11.72% |

### *4.2. Impact of a Metacognitive-Based Writerpreneur E-Platform on Metacognitive Skills*

The impact of the eight components of metacognitive awareness on essay writing abilities was investigated through a correlation study of the metacognitive components. The correlation analysis's findings are shown in Table 8. PK (r = 0.673), CK (r = 0.591), P (r = 0.612), M (r = 0.623), E (r = 0.678), IMS (r = 0.524), and DS (r = 0.542) were the correlation coefficients that showed a significant association between the declarative and procedural knowledge parts. At least 25% of the variance in one component was found in the other, as indicated by the fact that all correlation coefficients were over 0.50. As shown in Table 10, we provide regression analysis data to strengthen the correlation analysis by showing the relationship between each approach and essay writing skills. Furthermore, each technique is substantially associated with essay writing ability ($p < 0.001$) according to the correlation coefficients displayed in Table 9. Table 10 shows the relationship between essay writing proficiency and the eight techniques. Declarative knowledge (r = 0.742), procedural knowledge (r = 0.782), conditional knowledge (r = 0.823), planning (r = 0.803), monitoring (r = 0.841), evaluation (r = 0.834), information management strategies (r = 0.783), and debugging techniques (r = 0.764), as well as essay writing skills, were found to be strongly correlated.

**Table 8.** Correlation analysis of the eight components of the metacognitive approach.

| Metacognition aspect | DK | PK | CK | P | M | E | IMS | DS |
|---|---|---|---|---|---|---|---|---|
| Metacognition aspect | 1 | | | | | | | |
| Declarative knowledge | 0.673 | 1 | | | | | | |
| Procedural knowledge | 0.591 | 0.682 | 1 | | | | | |
| Conditional knowledge | 0.612 | 0.712 | 0.721 | 1 | | | | |
| Planning | 0.623 | 0.689 | 0.742 | 0.762 | 1 | | | |
| Monitoring | 0.678 | 0.742 | 0.761 | 0.721 | 0.784 | 1 | | |
| Evaluation | 0.524 | 0.583 | 0.673 | 0.693 | 0.762 | 0.652 | 1 | |
| Information management strategy | 0.542 | 0.612 | 0.693 | 0.651 | 0.674 | 0.641 | 0.72 | 1 |

**Table 9.** Correlation analysis between academic writing abilities and eight strategies.

| Metacognition aspect | AWP |
|---|---|
| Declarative knowledge | 0.742** |
| Procedural knowledge | 0.782** |
| Conditional knowledge | 0.823** |
| Planning | 0.803** |
| Monitoring | 0.841** |
| Evaluation | 0.834** |
| Information management strategy | 0.783** |
| Debugging strategy | 0.764** |

**Note:** ** $p < 0.01$.

Table 10 shows the results of the last study, which was a regression analysis. 88% of the variation in students' academic writing skill scores was explained by the eight components of metacognitive methods, according to the results of the regression analysis. The eight components of metacognitive methods were found to be a significant predictor of academic writing skills ($p < .001$) by regression analysis.

**Table 10.** Linear regression results of metacognitive approach components.

| Metacognition Aspect | Unstandardized coefficients | Std. E | Standardized coefficients | t | p | VIF | R2 | Adjusted R2 | F |
|---|---|---|---|---|---|---|---|---|---|
| | B | | Beta | | | | | | |
| Constant | 1.634 | 0.293 | - | 6.538 | 0.000** | - | 0.89 | 0.873 | 530.52*** |
| Declarative knowledge | 0.097 | 0.017 | 0.142 | 8.421 | 0.000** | 4.352 | | | |
| Procedural knowledge | 0.121 | 0.022 | 0.152 | 7.653 | 0.000** | 4.715 | | | |
| Conditional knowledge | 0.135 | 0.026 | 0.144 | 7.346 | 0.000** | 5.346 | | | |
| Planning | 0.082 | 0.016 | 0.135 | 6.856 | 0.000** | 5.241 | | | |
| Monitoring | 0.098 | 0.019 | 0.172 | 7.735 | 0.000** | 5.674 | | | |
| Evaluation | 0.091 | 0.016 | 0.183 | 8.645 | 0.000** | 5.843 | | | |
| Information management strategy | 0.091 | 0.017 | 0.152 | 7.682 | 0.000** | 3.746 | | | |
| Debugging strategy | 0.093 | 0.016 | 0.146 | 8.356 | 0.000** | 3.612 | | | |

**Note:** ** $p < 0.01$, *** $p < 0.001$.

### *4.3. Impact of a Metacognitive-Based Writerpreneur E-Platform on Literacy Entrepreneurship Motivation*

To assess the effect of the writerpreneur e-platform on literacy entrepreneurship motivation, a chi-square test for group independence was used. Table 11 displays the test results. According to the test results, in both groups, no more than 50% of the sample showed great literacy entrepreneurship motivation during the pre-test phase. However,

the number of students in the experimental group exhibiting great motivation increased during the post-test phase. More than half of the students demonstrated a significant increase in their reading motivation. Findings from examining literacy entrepreneurship motivation during the post-test phase are shown in Tables 12 and 13. The proportion of students who felt strongly driven to read did not differ significantly from the control group. The differences in literacy entrepreneurial motivation between the experimental and control groups are displayed in Table 14. Based on the analysis, the number of students demonstrating strong literacy entrepreneurship motivation increased sharply during the post-test phase, with a value of ($df = 1$, $p < 0.05$). Furthermore, the application of animated video scaffolding within a task-based learning approach to literacy entrepreneurship motivation demonstrated a significant effect size, with a Cramer's V value of 0.520. This value indicates that the intervention's impact was substantial or significant.

**Table 11.** Cross-sectional table of literacy entrepreneurship motivation levels in the pre-test.

| Group | Motivation time | | Total |
|---|---|---|---|
| | Motivated | Unmotivated | |
| Experiment | 12 | 116 | 128 |
| Control | 10 | 118 | 128 |

**Table 12.** Results of the chi-square test of reading motivation in the pretest phase.

| Measurement | Value | df | Asymp. sig. | Exact sig. | Exact sig. |
|---|---|---|---|---|---|
| Chi-squared Pearson | 0.150 | 1 | 0.834 | | |
| Continuity correction | 0.002 | 1 | 1.003 | | |
| Probability ratio | 0.150 | 1 | 0.832 | | |
| Fisher's precise test | | | | 1.000 | 0.630 |
| Linear-by-linear correlation | 0.146 | 1 | 0.930 | | |
| N | 256 | | | | |

**Table 13.** Cross-table of the impact of the intervention on entrepreneurial motivation in the post-test.

| Group | Motivation time | | Total |
|---|---|---|---|
| | Motivated | Unmotivated | |
| Experiment | 125 | 3 | 128 |
| Control | 28 | 100 | 128 |

**Table 14.** Results of the chi-square test of the impact of the intervention on entrepreneurial motivation in the post-test.

| Measurement | Value | df | Asymp. sig. | Exact sig. | Exact sig. |
|---|---|---|---|---|---|
| Chi-squared Pearson | 15.725 | 1 | 0.000 | | |
| Continuity correction | 13.752 | 1 | 0.002 | | |
| Probability ratio | 16.423 | 1 | 0.000 | | |
| Fisher's precise test | | | | 0.002 | 0.000 |
| Linear-by-linear correlation | 16.460 | 1 | 0.000 | | |
| N | 256 | | | | |

## 5. DISCUSSION

The goal of the current study was to find out how a writerpreneur e-platform based on metacognition affected essay writing abilities. The results demonstrated that students in the experimental group (metacognitive-based writerpreneur e-platform) outperformed students in the control group (conventional writing) in terms of essay writing skills. These findings align with previous findings that platform-based writing learning can improve essay writing skills, particularly in improving writing accuracy (Ajabshir & Ebadi, 2023; Kim, Lee, Detrick, Wang, & Li, 2025). This improvement in academic essay skills occurred because students received feedback sessions and metacognitive strategies throughout the process, significantly impacting their writing skills. This finding is further supported by previous studies that found that platforms that provide explanatory feedback contain comprehensive

and synchronous metalinguistics (Kieslich et al., 2025). Through this process, students' attention and awareness of writing errors are enhanced, leading to more effective corrections. This contrasts with traditional writing learning that receives manual feedback, which lacks comprehensive feedback (Liu, 2024; Rahimi, Fathi, & Zou, 2025).

Further findings indicate that each aspect of writing ability in the experimental group generally demonstrated better scores than the academic writing ability of the control group. However, there were no significant differences in cohesion, coherence, and lexicon between the two groups. This occurs because the cohesion, coherence, and lexicon aspects require additional in-depth analysis of linguistic components to form a cohesive essay. Furthermore, e-platforms still do not accommodate these aspects, which require additional analysis. These findings align with previous studies confirming that students who receive online feedback demonstrate better writing quality than those who receive manual feedback on paper, in terms of grammar and accuracy (Banihashem, Kerman, Noroozi, Moon, & Drachsler, 2024; Shulgina et al., 2024). These findings indicate that online feedback contributes significantly to writing accuracy, but its quality is comparable to that of traditional feedback in terms of cohesion, coherence, and lexicon. The finding that the e-platform of writerpreneur significantly impacts writing accuracy is also supported by previous research showing that students who receive feedback and a metacognitive approach through a metacognitive writing platform simultaneously correct their writing errors, thereby improving their writing accuracy (Biju et al., 2024; Liu, 2024). Furthermore, the improvement in writing performance in terms of task achievement through the writerpreneur e-platform occurred because the platform helped students save time and focus on higher-level feedback aspects of their drafts, enabling them to complete their writing more effectively. These findings align with previous studies that revealed that using an online feedback application as a feedback tool helps instructors focus more on key writing issues and contributes significantly to writing quality (Hancock & Karakok, 2021; Mohammed & Khalid, 2025).

The next finding is that knowledge and regulation are two of the eight components of the metacognitive method that are pertinent to essay writing. Declarative, procedural, and conditional knowledge, task awareness, strategies, and the student's own efforts are the components of the metacognitive knowledge component. Planning, observing, and assessing are all included in the metacognitive regulation component, which emphasizes the role of regulation (Hancock & Karakok, 2021; Li & Hebert, 2024). The research results show that there are multiple dimensions that are highly important and offer the most substantial contribution. These elements consist of declarative, conditional, procedural, and metacognitive information. The idea that children can become strategic learners provided they have strong aspects of declarative, procedural, and conditional knowledge is supported by this (Davies & Greenwood, 2020; Keith et al., 2020). Moreover, the results of this research also emphasize that an individual aiming to develop strong essay writing abilities must possess an adequate understanding of employment strategies, the implementation of those strategies, and the capability to effectively elaborate on content. Additionally, goal-setting, time management, and resource planning in academic writing are all included in the metacognitive approach's planning dimension (Gidh-Jain et al., 2024; Suraworachet, Zhou, & Cukurova, 2023).

Furthermore, the monitoring dimension investigates textual processing, distraction control, lexical ability, and transcription processes. These findings support previous findings confirming that students who are able to use several strategies to regulate metacognition during the writing process are able to achieve better academic writing skills (Dahl-Leonard, Hall, & Capin, 2025; Pan et al., 2023). Furthermore, the evaluation dimension highlights language use, quality, writing organization, and content. The research findings indicate that stimulating self-reflection in writing evaluation is necessary for students' writing skills to continue developing. This aligns with the theory that self-evaluation and reflection can enhance learning outcomes (Calderon & Herrera, 2025; Norén et al., 2022). Items on information management reveal the ability to organize ideas, elaborate, summarize, and select ideas. This study demonstrates that an e-platform with a metacognitive approach improves students' ability to plan and organize their thoughts to produce quality conceptual articles. Another finding is that the writerpreneur e-platform, based on a metacognitive approach, can increase literacy entrepreneurship motivation more than students who received

traditional writing interventions (Jongsma et al., 2025; Khuder & Negretti, 2025). These findings demonstrate that the intervention is highly effective in increasing literacy entrepreneurship motivation. This increased motivation occurred due to the digital work store feature, or writerpreneur zone, which increased students' interest in various literacy entrepreneurship opportunities. Through this feature, students can publish and sell their essays, thereby fostering a spirit of literacy entrepreneurship. These findings are consistent with other research showing that multimodal scaffolding and task-based instruction can increase student motivation (Heeks, 2022; Qualter, 2024).

## 6. CONCLUSION

The writerpreneur e-platform, based on a metacognitive approach, significantly contributed to improved essay writing skills, metacognitive awareness, and literacy entrepreneurship. The quality of the writing demonstrated improved essay writing abilities and satisfied a number of criteria, such as task accomplishment, coherence, cohesiveness, grammatical range and accuracy, and lexicon.

In addition, writing learning using the writerpreneur E-platform based on the metacognitive approach was able to optimize the behavioral, cognitive, and affective involvement of students, and most students showed positive attitudes and perceptions towards the use of the writerpreneur E-platform based on the metacognitive approach in writing learning.

This enhancement resulted from various contributions from the entrepreneur e-platform, which encompassed explicit error recognition, the application of adaptive metalinguistics, and the offering of immediate feedback. Furthermore, the focus of the feedback went beyond main issues (content, organization of ideas, style, writing focus, and overall writing ability) to encompass other aspects of writing, such as task achievement, cohesion, coherence, range, grammatical accuracy, and vocabulary. Additionally, the metacognitive approach significantly improved students' abilities in composing essays.

The metacognitive method acts as a comprehensive structure, demonstrating a favorable connection between its aspects. Descriptive, procedural, and conditional knowledge were among the associated and contributory metacognitive dimensions that were found, along with methods for organizing, tracking, assessing, managing information, and troubleshooting. Furthermore, the writerpreneur platform that is focused on metacognition might increase enthusiasm for literacy entrepreneurship.

This research suggests that integrating technology into writing education can enable teachers to enhance writing abilities, as some teachers' efforts to elevate the quality of students' writing are supported by technological tools. Moreover, incorporating technology into writing education enhances the engagement of students' behavioral, cognitive, and emotional dimensions in writing, thereby significantly benefiting writing abilities and entrepreneurial prospects in literacy.

This research faces various limitations, including the inability to verify the correctness or lack of feedback outcomes produced by the app, the sample size being limited and concentrated on a single educational level, the absence of an inquiry into additional competencies that enhance writing abilities, such as critical thinking in processing feedback, whether manual or automated, and the insufficient examination of cognitive and emotional behavioral factors in students subjected to conventional feedback.

Given the study's limitations, the researcher proposes several recommendations for future research, which include implementing a feedback confirmation session to enhance students' critical thinking abilities in processing and choosing the provided feedback, expanding the sample to higher education levels, examining the relationship between students' critical thinking skills and their academic writing proficiency, and investigating the behavioral, cognitive, and emotional dimensions in students engaging with traditional learning methods.

**Funding:** This research was funded by the Ministry of Higher Education, Science and Technology (Kemdiktisaintek) (Grant number: 7993/LL4/PG/2025),
**Institutional Review Board Statement:** This study was approved by the Institutional Review Board of IKIP Siliwangi, Indonesia, under protocol number (035/IKIP-Slw/LPPM/VI/2025), dated (4 June 2025). Informed verbal consent was obtained from all participants, and all data were anonymized to protect participant confidentiality.
**Transparency:** The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
**Competing Interests:** The authors declare that they have no competing interests.
**Authors' Contributions:** All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

## REFERENCES

Ajabshir, Z. F., & Ebadi, S. (2023). The effects of automatic writing evaluation and teacher-focused feedback on CALF measures and overall quality of L2 writing across different genres. *Asian-Pacific Journal of Second and Foreign Language Education*, *8*(1), 26. https://doi.org/10.1186/s40862-023-00201-9

Alfaifi, M. J. (2022). A suggested model for metacognitive strategy instruction in EFL writing classrooms. *Reading & Writing Quarterly*, *38*(4), 323-339. https://doi.org/10.1080/10573569.2021.1954569

Alharbi, M. A., & Albelihi, H. H. (2023). Transforming writing education: WAC faculty experiences and challenges in Saudi universities. *Asian-Pacific Journal of Second and Foreign Language Education*, *8*(1), 28. https://doi.org/10.1186/s40862-023-00199-0

Banaruee, H., Khatin-Zadeh, O., & Ruegg, R. (2018). Recasts vs. direct corrective feedback on writing performance of high school EFL learners. *Cogent Education*, *5*(1), 1455333. https://doi.org/10.1080/2331186X.2018.1455333

Banihashem, S. K., Kerman, N. T., Noroozi, O., Moon, J., & Drachsler, H. (2024). Feedback sources in essay writing: peer-generated or AI-generated feedback? *International Journal of Educational Technology in Higher Education*, *21*(1), 23. https://doi.org/10.1186/s41239-024-00455-4

Biju, N., Abdelrasheed, N. S. G., Bakiyeva, K., Prasad, K. D. V., & Jember, B. (2024). Which one? AI-assisted language assessment or paper format: an exploration of the impacts on foreign language anxiety, learning attitudes, motivation, and writing performance. *Language Testing in Asia*, *14*(1), 45. https://doi.org/10.1186/s40468-024-00322-z

Calderon, R., & Herrera, F. (2025). And Plato met ChatGPT: An ethical reflection on the use of chatbots in scientific research writing, with a particular focus on the social sciences. *Humanities and Social Sciences Communications*, *12*(1), 713. https://doi.org/10.1057/s41599-025-04650-0

Chen, M., Chai, C.-S., & Jong, M. S.-Y. (2023). Actualization of teaching conceptions in lesson design: How teaching conceptions shape TPACK regarding spherical video-based virtual reality-supported writing instruction. *Educational Technology Research and Development*, *71*(6), 2321-2344. https://doi.org/10.1007/s11423-023-10295-0

Conijn, R., Martinez-Maldonado, R., Knight, S., Buckingham Shum, S., Van Waes, L., & van Zaanen, M. (2022). How to provide automated feedback on the writing process? A participatory approach to design writing analytics tools. *Computer Assisted Language Learning*, *35*(8), 1838-1868. https://doi.org/10.1080/09588221.2020.1839503

Dahl-Leonard, K., Hall, C., & Capin, P. (2025). Exploring the feasibility of implementing the SPELL-Links to reading and writing intervention. *Annals of Dyslexia*, *75*(1), 71-95. https://doi.org/10.1007/s11881-024-00315-w

Davies, G., & Greenwood, K. (2020). A meta-analytic review of the relationship between neurocognition, metacognition and functional outcome in schizophrenia. *Journal of Mental Health*, *29*(5), 496-505. https://doi.org/10.1080/09638237.2018.1521930

Dirrigl Jr, F. J., & Noe, M. (2019). The teacher writing toolkit: Enhancing undergraduate teaching of scientific writing in the biological sciences. *Journal of Biological Education*, *53*(5), 524–540. https://doi.org/10.1080/00219266.2018.1501410

Ebrahimi, B., & Ebadi, S. (2024). Exploring the impact of screencast-based ipsative assessment on EFL students' writing development. *Language Testing in Asia*, *14*(1), 41. https://doi.org/10.1186/s40468-024-00315-y

French, A. (2020). Academic writing as identity-work in higher education: Forming a 'professional writing in higher education habitus'. *Studies in Higher Education*, *45*(8), 1605-1617. https://doi.org/10.1080/03075079.2019.1572735

Gao, H., Hashim, H., & Md Yunus, M. (2025). Assessing the reliability and relevance of DeepSeek in EFL writing evaluation: A generalizability theory approach. *Language Testing in Asia*, *15*(1), 33. https://doi.org/10.1186/s40468-025-00369-6

Gidh-Jain, M., Parke, T., König, F., Spiertz, C., & Mesenbrink, P. (2024). Developing generic templates to shape the future for conducting integrated research platform trials. *Trials*, *25*(1), 204. https://doi.org/10.1186/s13063-024-08034-8

Guyer, C., Stewart, B., Khalifa, Z., Pham, L., & Saad, A. H. (2024). Implementation and evaluation of an interprofessional prescription writing workshop with a simulated electronic prescribing activity for preclerkship medical students. *BMC Medical Education*, *24*(1), 394. https://doi.org/10.1186/s12909-024-05326-0

Hancock, E., & Karakok, G. (2021). Supporting the development of process-focused metacognition during problem-solving. *PRIMUS*, *31*(8), 837-854. https://doi.org/10.1080/10511970.2020.1772914

Heeks, R. (2022). Digital inequality beyond the digital divide: Conceptualizing adverse digital incorporation in the global South. *Information Technology for Development*, *28*(4), 688-704. https://doi.org/10.1080/02681102.2022.2068492

Highland, K. D., & Fedtke, J. (2023). Rethinking the essay: Student perceptions of collaborative digital multimodal composition in the college classroom. *Higher Education Pedagogies*, *8*(1), 2216194. https://doi.org/10.1080/23752696.2023.2216194

Jin, S. (2025). Writing in the digital age: Understanding the relationship between social media use and college students' writing skills and anxiety. *Humanities and Social Sciences Communications*, *12*(1), 1048. https://doi.org/10.1057/s41599-025-05443-1

Jongsma, M. V., Meeter, M., van Muijlwijk-Koezen, J. E., & Scholten, D. J. (2025). The role of platform design in online peer feedback: A comparison of two digital environments. *Education and Information Technologies*, *30*(14), 20797–20820. https://doi.org/10.1007/s10639-025-13598-2

Keith, S., Stives, K. L., Kerr, L. J., & Kastner, S. (2020). The role of academic background and the writing centre on students' academic achievement in a writing-intensive criminological theory course. *Educational Studies*, *46*(2), 154-169. https://doi.org/10.1080/03055698.2018.1541788

Khuder, B., & Negretti, R. (2025). Collaborative writing regulation: A comparative case study of co-regulation and socially shared regulation in higher education. *Higher Education*, 1-23. https://doi.org/10.1007/s10734-025-01437-9

Kieslich, K., Diakopoulos, N., & Helberger, N. (2025). Anticipating impacts: Using large-scale scenario-writing to explore diverse implications of generative AI in the news environment. *AI and Ethics*, *5*(5), 4555–4577. https://doi.org/10.1007/s43681-024-00497-4

Kim, J., Lee, S.-S., Detrick, R., Wang, J., & Li, N. (2025). Students-Generative AI interaction patterns and its impact on academic writing. *Journal of Computing in Higher Education*, 1-22. https://doi.org/10.1007/s12528-025-09444-6

Kim, J., Yu, S., Detrick, R., & Li, N. (2025). Exploring students' perspectives on generative AI-assisted academic writing. *Education and Information Technologies*, *30*(1), 1265-1300. https://doi.org/10.1007/s10639-024-12878-7

Kim, Y.-S. G., Lee, J. W., Cao, Y., & Cho, M. (2025). Perspective taking and writing quality for secondary students. *Reading and Writing*, 1-22. https://doi.org/10.1007/s11145-025-10655-7

Li, A. W., & Hebert, M. (2024). Unpacking an online peer-mediated and self-reflective revision process in second-language persuasive writing. *Reading and Writing*, *37*(6), 1545-1573. https://doi.org/10.1007/s11145-023-10466-8

Liu, J. (2024). Meaning-oriented understanding of L2 academic writing development with task-type repetition. *Humanities and Social Sciences Communications*, *11*(1), 1167. https://doi.org/10.1057/s41599-024-03688-w

Ma, R., Zhang, B., Xu, G., Wang, F., Liu, X., Wang, Z., & Qiu, J. (2025). Reversible writing of high-density dislocations with multidimensional controllability in PMN-PT crystal. *Nature Communications*, *16*(1), 5966. https://doi.org/10.1038/s41467-025-61095-4

Mohammed, S. J., & Khalid, M. W. (2025). Under the world of AI-generated feedback on writing: Mirroring motivation, foreign language peace of mind, trait emotional intelligence, and writing development. *Language Testing in Asia*, *15*(1), 7. https://doi.org/10.1186/s40468-025-00343-2

Norén, N., Melander Bowden, H., & Evaldsson, A.-C. (2022). Young students' treatment of synthetic voicing as an interactional resource in digital writing. *Classroom Discourse, 13*(3), 241-263. https://doi.org/10.1080/19463014.2020.1814367

Pan, Y., Zhang, J., Zou, C., Li, M., & Yang, H. (2023). The impact of writing notations and response types: A spatial representation study on fractions. *Current Psychology, 42*(13), 10482-10497. https://doi.org/10.1007/s12144-023-04501-8

Peungcharoenkun, T., & Waluyo, B. (2023). Implementing process-genre approach, feedback, and technology in L2 writing in higher education. *Asian-Pacific Journal of Second and Foreign Language Education, 8*(1), 34. https://doi.org/10.1186/s40862-023-00211-7

Pletcher, B. C., Williams, C., & Shaikh, R. (2025). Interactive writing in a first grade classroom as a venue for teaching early concepts of print and expanding oral language. *Early Childhood Education Journal*, 1-14. https://doi.org/10.1007/s10643-025-01950-7

Qualter, D. (2024). From digital exclusion to digital inclusion: Shaping the role of parental involvement in home-based digital learning–A narrative literature review. *Computers in the Schools, 41*(2), 120-144. https://doi.org/10.1080/07380569.2024.2322167

Rafi, M. S., & Amjad, I. (2025). The role of generative AI in writing doctoral dissertation: Perceived opportunities, challenges, and facilitating strategies to promote human agency. *Discover Education, 4*(1), 165. https://doi.org/10.1007/s44217-025-00503-9

Rahimi, M., Fathi, J., & Zou, D. (2025). Exploring the impact of automated written corrective feedback on the academic writing skills of EFL learners: An activity theory perspective. *Education and Information Technologies, 30*(3), 2691-2735. https://doi.org/10.1007/s10639-024-12896-5

Sanchez, N., Norka, A., Corbin, M., & Peters, C. (2019). Use of experiential learning, reflective writing, and metacognition to develop cultural humility among undergraduate students. *Journal of Social Work Education, 55*(1), 75-88. https://doi.org/10.1080/10437797.2018.1498418

Shulgina, G., Costley, J., Shcheglova, I., Zhang, H., & Sedova, N. (2024). Online peer editing: The influence of comments, tracked changes and perception of participation on students' writing performance. *Smart Learning Environments, 11*(1), 30. https://doi.org/10.1186/s40561-024-00315-8

Suraworachet, W., Zhou, Q., & Cukurova, M. (2023). Impact of combining human and analytics feedback on students' engagement with, and performance in, reflective writing tasks. *International Journal of Educational Technology in Higher Education, 20*(1), 1-24. https://doi.org/10.1186/s41239-022-00368-0

Tate, T. P., Harnick-Shapiro, B., Ritchie, D. R., Tseng, W., Dennin, M., & Warschauer, M. (2025). Incorporating generative AI into a writing-intensive undergraduate course without off-loading learning. *Discover Computing, 28*(1), 72. https://doi.org/10.1007/s10791-025-09563-9

Toprak, Z., & Yücel, V. (2020). A peculiar practice of academic writing: Epidemic writing in the Turkish graduate education. *Cogent Education, 7*(1), 1774098. https://doi.org/10.1080/2331186X.2020.1774098

Villabona, L.-Y., & Villalón Molina, R. (2023). Academic writing practices in a psychology degree in the distance learning modality. *Cultura Educacion, 35*(1), 64–93. https://doi.org/10.1080/11356405.2022.2121129

Wang, D., & Wang, J. (2025). The impact mechanism of AES on improving English writing achievement. *Scientific Reports, 15*(1), 3928. https://doi.org/10.1038/s41598-025-88021-4

Wigfield, A., & Guthrie, J. T. (1995). *Dimensions of children's motivations for reading: An initial study*. Reading Research Report No. 34, Athens, GA & College Park, MD, United States: National Reading Research Center.

Zheng, X., & Zhang, J. (2025). The usage of a transformer based and artificial intelligence driven multidimensional feedback system in English writing instruction. *Scientific Reports, 15*(1), 19268. https://doi.org/10.1038/s41598-025-05026-9