The effectiveness of incorporating metacognitive prompts in collaborative writing on academic English writing skills

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Abstract
Research shows that acquisition of writing skills can be supported by metacognitive strategy training. However, research on incorporating metacognitive guidance for collaborative writing is scarce. The current study explores the potential effectiveness of incorporating metacognitive prompts, that is, a form of metacognitive guidance, into collaborative writing on academic English writing skills. This study involves four instructional methods, that is, collaborative writing combined with embedded metacognitive guidance (COLL+META), metacognitive training without collaborative writing (META), collaborative writing without metacognitive training (COLL), and individual learning (CG). The dependent variables were students' four academic writing skills, that is, reproduction of text structure knowledge, application of text structure knowledge, reduction of text content, and abstract writing. Participants included 160 students who were learning English as a foreign language (EFL) at a university in mainland China. The participants in each condition received 16 weeks of treatment sessions. The results revealed the improvement from pre-test to post-test, supporting the main effects of each learning condition on the four academic writing skills. The results also showed that the COLL+META students demonstrated significantly higher scores in the four academic writing skills than students in the other conditions. This study underlines the importance of incorporating metacognitive strategies for collaborative writing in developing academic writing skills for university EFL students. This study also highlights the potential in applying educational psychology theories for English education.

KEYWORDS
academic writing skills, collaborative writing, metacognitive awareness, metacognitive prompts, self-regulatory capacity

1 | INTRODUCTION

Helping students acquire academic writing skills, that is, the knowledge required to write different sections of a scholarly article, has gained momentum in higher education. However, academic writing in a foreign language has been acknowledged as a challenge in higher education (Dolores et al., 2003). For example, students lacked knowledge of what constituted academic writing, and often regarded writing as a solitary activity (Van De Poel & Gasiorek, 2012). They lacked the interaction and dialog with others, which was highlighted in social development theory (Vygotsky, 1978). EFL learners were also found to lack skills in planning, organization, monitoring, and evaluating for writing (Teng, 2016). In an attempt to produce the strongest scientific text possible, student writers lacked awareness of appropriate strategies, or had difficulty exercising control over explaining, monitoring, evaluating, analyzing, and synthesizing information for a scientific topic (Proske & Kapp, 2013). Notions, such as “academic discoursal consciousness” (Belcher & Braine, 1995, p. xv), “discourse synthesis”
(Spivey, 1990, p. 279), “academic discourse socialization” (Duff, 2010, p. 171), and “rhetorical consciousness raising” (Hyland, 2007, p. 160) highlight the importance of learners’ self-regulated behaviors in learning to write. Related to this, learners may find academic writing difficult because of the limited metacognitive awareness and control while writing (Yarrow & Topping, 2001).

Studies have acknowledged the role of metacognitive awareness in encouraging students to take more initiative in developing a personal academic writing process. Research has also revealed learners may suffer due to the lack of external feedback when transitioning from spoken to written communication (Teng, 2020a; Zinchuk, 2015). In conversation, students may receive verbal and nonverbal signals from a partner and such signals may constantly stimulate and modify further thought and language production. However, learners may not receive sufficient feedback for language production in the case of writing (Storch, 2005). To address such pitfalls, Lam and Kapur (2017) proposed using cooperative learning to help prepare students cognitively for learning. This statement suggests the potential in collaborative writing. Collaborative writing is conceptualized as the process of producing a written work based on group work. During this process, all team members contribute to the content and facilitate each other to express divergent points of view, develop critical thinking skills, and present a rational and defensible argument that ultimately results in writing (Yarrow & Topping, 2001). This method aligns with Vygotsky’s (1978) theoretical basis of using social interaction to develop higher-order cognitive processes. For example, thinking occurs interpersonally (i.e., as learners interact in social contexts) before it occurs intrapersonally (i.e., in learners' minds).

Incorporating metacognitive guidance into collaborative writing may help mitigate the internal constraints in writing. Such a technique may provide learners opportunities to engage in peer interaction that facilitates rationalization and argumentation in writing. For instance, during collaborative writing, group members can build on each other’s knowledge and feedback to produce a written essay of good quality (Storch, 2005). As argued by Azevedo and Hadwin (2005), students collaborating in small groups could help learners reflect on their metacognitive skills to scaffold self-regulated learning. The incorporation of metacognitive prompts in a collaborative writing condition might be particularly effective for learners who find it difficult to set clear goals to guide their writing, recognize their writing problems, redirect when deviating from their goals for writing, and plan how to structure the group process (Teng, 2020a). The potential in incorporating metacognitive guidance in collaborative writing is supported by theories and research. First, metacognitive guidance in collaborative writing can help learners process feedback. The feedback may lead to better writing outcomes; indeed, cognitive theories of learning tend to emphasize the role of elaboration in constructing new knowledge (Lam & Kapur, 2017). Second, incorporating metacognitive guidance in collaborative writing has the potential to improve learners’ socially shared self-regulation and co-regulation (Molenaar et al., 2010). Thus, cooperative-metacognitive guidance can be applied to overcome a group’s lack of regulation in stimulating metacognitive activities in an interpersonal setting. Scaffolds and peer interaction could contribute to the development of metacognitive skills, which prepared learners to elaborate on knowledge, synthesize reasoning details, and foster critical thinking skills even without scaffolding (Yarrow & Topping, 2001).

To the author’s limited knowledge, no studies have been conducted to examine how incorporating metacognitive prompts into collaborative writing may improve EFL students’ academic writing skills. In particular, when and under which conditions metacognitive knowledge and strategies can be applied for the acquisition of academic writing skills have not been explored. As Negretti (2012) contended, the psychological and cognitive processes underlying academic writing merit further research to illuminate the learning dynamics in which students can be guided to engage as they practice relevant writing skills (see also Teng & Huang, 2019). In this article, I identify the need for incorporating metacognitive guidance in collaborative writing to enhance the acquisition of academic writing skills. Academic writing skills, conceptualized as an ability to develop the essential skills needed to compose texts (Kellogg, 2008), are dependent on the experiences related to metacognitive training and collaborative writing (Teng, 2016; Wischgoll, 2016). The purpose of the present study is to examine the impact of incorporating metacognitive guidance into collaborative writing on students’ academic writing skills.

2 | LITERATURE REVIEW

2.1 | Metacognition and writing

Metacognition, according to Flavell (1979), refers to an awareness of one’s own cognitive processes along with controlled regulation of mental activities. Metacognition includes two basic components: knowledge and regulation of metacognition (Schraw & Dennison, 1994). Knowledge of metacognition concerns a learner’s own cognition (or cognition in general) and encompasses three types of knowledge: (1) declarative knowledge (factual knowledge about an individual’s capabilities and the factors influencing his or her academic success); (2) procedural knowledge (knowledge of how something happens in a particular way); and (3) conditional knowledge (knowledge needed to discern from diverse perspectives the logic behind taking a cognitive action) (Jacobs & Paris, 1987). Regulation of metacognition signifies a set of mental activities that enable a learner to regulate his or her own learning processes through three essential regulatory skills: (1) planning (choosing appropriate strategies and effectively allocating resources to complete a task); (2) monitoring (observing task comprehension and identifying targets for optimal performance); and (3) evaluation (appraising the regulatory process and the efficiency with which a task is completed) (Schraw, 1998).

Metacognition reflects an individual’s ability to reflect on, monitor, and control his or her knowledge and thoughts (Flavell, 1979). Metacognition is a broad notion often discussed alongside self-regulation (Bandura, 1986) and self-regulated learning (Zimmerman, 1986). These three notions comprise a complex set of abilities individuals can harness to realize self-observation, self-judgment, and self-reaction or to activate and sustain cognitions and behaviors to attain
learning goals (for a review, see Zimmerman & Schunk, 2011). These concepts are rooted to some extent in agency (Bandura, 2001), which refers to an intricate relationship between people’s behaviors and environmental norms. Agency is predicated on the idea that individuals can monitor their agency, modify their behaviors to conform to environmental norms, and make metacognitive assessments about when and whether they are in control. Metacognition is regarded as a key component of agency and has been deemed a stimulus for self-regulated learning, such that metacognition can help learners transfer skills, knowledge, and strategies across situations (Schraw, 1998, 2009). The present study was theoretically grounded on this premise: academic writing skills are dependent on the development of metacognitive awareness and strategic self-regulation in writing. Hence, metacognitive awareness is closely tied to academic writing, which can be defined as a communicative, socially situated, and interaction-based activity.

Research has highlighted the link between metacognition and writing, wherein metacognition is associated with learners’ ability to adapt knowledge for cognitive purposes and harness strategies to self-regulate their writing (Teng, 2016, 2019a,b; Nguyen & Gu, 2013; Santelmann et al., 2018). In a recent study (Teng, 2020b), metacognitive training was combined with text structure training for young student writers. Results showed that combining text structure and metacognitive strategies were effective at enhancing writing. The results also highlighted the value of planning, revising, monitoring, and evaluating strategies for writing. Similarly, Ma and Teng (2021) investigated the relationship between metacognition and writing. They conducted qualitative analyses to analyze metacognitive processes of two low-proficiency students learning EFL writing. The results showed variations in the two students’ engagement in metacognitive knowledge development. The variations in metacognitive knowledge development may be one important factor that can explain their individual differences in writing. Related to this, Nguyen and Gu (2013) suggested a need for explicit metacognitive strategy-based instruction in writing. Such need was demonstrated by evidence that instruction of metacognitive strategies could help Vietnamese students become better strategy users and more efficient writers. Their findings highlighted the value of metacognitive control over successful orchestration of strategy deployment for writing. Teng (2020a) also explored university students’ writing performance after receiving instruction about metacognitive strategies. A total of 120 students were divided into three groups, that is, group feedback guidance (GFG), self-explanation guidance (SEG), and a control group (CG) not receiving metacognitive guidance. Results showed that students who received group feedback guidance on metacognitive knowledge demonstrated the best performance in writing. The findings highlighted the group work on fostering metacognitive awareness. For example, group feedback inspired learners to reflect on their writing processes, thus refining their use of metacognitive strategies.

The findings in the above empirical studies were consistent with Brown’s (1987) argument that metacognition enables learners to understand their strengths and weaknesses and obtain insight into appropriate strategies. According to the cognitive theory of writing (Flower & Hayes, 1981) and the model of cognitive development (Kellogg, 2008), writing is a cognitive representation, and writers’ understanding of a rhetorical situation determines their ability to monitor and evaluate writing-related decisions. Flower and Hayes (1981) also delineated three major elements in writing: the task environment, the writer’s long-term memory, and the writing processes. These three elements highlight metacognitive aspects of writing, in which composing academic texts is a process of harnessing metacognitive knowledge of genre-relevant features and making metacognitive decisions related to content, organization, and style. Hacker et al. (2009) proposed the executive component of metacognition in writing, for which “writing is applied metacognition” (p. 154). The notion of “metapragmatics” (Gombert, 1993, p. 574) represents the interface between metalinguistic and metacommunicative features. Based on the two notions, metacognition is tied to academic writing communication. Such awareness may help learners adapt their writing strategies, understand their roles as writers, and fulfill their academic writing purposes.

Hence, academic writing is connected to metacognitive awareness, for which learners need to develop a personal, self-regulatory, and agentive approach to understand writing. Students’ challenges in academic writing stem from the lack of metacognitive knowledge and regulatory ability to self-evaluate compositions during and after the writing process. Given that the composition process involves planning, goal setting, information organization, and evaluation (MacArthur et al., 2015), learners must draft academic texts that are rhetorically and stylistically situated in disciplinary discourse and then act as an executive by observing these processes and employing those best suited at the appropriate time. Strategies in helping learners verbalize their thinking patterns and analyze relational structures for thinking are essential to writing. Related to this, incorporating metacognitive prompts into collaborative writing represents a new technique to explore the effectiveness of metacognitive training on writing.

### 2.2 Cooperative learning and writing

Research has demonstrated that students may lack sufficient regulatory skills in academic writing (Graham & Harris, 2000), for which collaborative writing may help learners pool ideas and provide each other with feedback (Storch, 2005). From a theoretical perspective, group work in cooperative learning settings corresponds with a social constructivist view of learning, which was proposed by Vygotsky (1978). According to Vygotsky, human development is inherently a socially situated activity, and individuals may develop self-regulation through social interactions with others who are more knowledgeable. Thus, cooperative learning, which refers to the instructional practice of placing learners in small groups and allowing them to work toward shared goals or improve their understanding of a subject (Lam & Kapur, 2017), is important in applied cognitive psychology research (Slavin, 1996). Learners should be encouraged to take part in activities which foster interaction and co-construction of knowledge. Based upon cognitive load theory, individual learning becomes less effective
and efficient than learning through group work as task complexity increases (Kirschner et al., 2009). With regard to writing instruction, the writing process is learned and developed within a social and cultural context, as stated in the Flower model (Flower, 1994). In this respect, writing is inherently a socially communicative act. Learners who transform spoken communication into written communication may lack external feedback, and a peer’s verbal and nonverbal signals may stimulate and modify the learner’s thought process and language production (Bereiter & Scardamalia, 1987).

Some studies have found that collaborative writing can positively influence writing skills. For example, pair writing may improve learners’ abilities to develop valid arguments, engage in deep processing, and participate in insightful discussions. The pairs thus produced shorter but better texts in terms of task fulfillment, grammatical accuracy, and complexity (Storch, 2005). In addition, a writer’s engagement in peer revisions or negotiations while composing a text may enhance his or her writing skills (Suzuki, 2008). These findings coincide with those of Borge and White (2016), who noted that peers challenged each other’s thoughts and thus developed monitoring and regulatory activities when working in groups. Therefore, collaborative writing is regarded as an effective means of developing knowledge or strategies required for skillful writing practice.

Given the limitations of knowledge construction through a learner’s internal cognitive process, several studies have suggested employing interventions, for example, training of metacognitive strategies, to help students self-regulate their writing. For instance, Teng (2016) divided 120 university students into three groups: a combination of metacognitive instruction and cooperative learning, cooperative learning without metacognitive instruction, and a control group. The results showed that the learners who received cooperative-metacognitive guidance outperformed those in the other two groups. Similarly, Teng (2020a) explored the effects of using group metacognitive guidance on writing performance. The participants included a total of 120 university students. The findings revealed that students who received group metacognitive guidance showed the best outcome in writing.

Therefore, the use of metacognitive prompts in collaborative writing has the potential to enhance writing. From a socio-cognitive perspective, reciprocal activities between group learners play a mediating role in others’ learning (Salomon, 1993). Group members influence each other’s contributed knowledge and skills in a spiral-like fashion. This type of activity elicits new activities from group learners and encourages them to practice skills individually, which subsequently shapes their practices of socially shared self- and co-regulation (Molenaar et al., 2010). As argued by Vygotsky (1978), the transfer of regulation from external (socially shared self-regulation and co-regulation) to internal (self-regulation) is key to learning enhancement. As summarized in a review article (Gress & Hadwin, 2010), applying metacognitive strategies to support collaborative learning could be an effective approach for optimizing the collaborative experience. The capacity to monitor and control one’s learning may be developed by observing others monitoring and controlling their learning via collaboration. The provision of metacognitive strategies in a collaborative learning context may offer opportunities for learners to ask questions, model strategies, and provide assistance to peers, leading students to develop a metacognitive conscience and to monitor and control effective writing tactics (Teng, 2016).

### 2.3 | Significance of the study

The present study included four independent variables: embedded metacognitive guidance in collaborative writing (COLL+META), metacognitive training without collaborative writing (META), collaborative writing without metacognitive training (COLL), and individual learning (CG). Embedded metacognitive guidance in collaborative writing (COLL+META) was based on the assumption that students in a foreign language context may not have sufficient peer-to-peer interactions that afford them deeper writing-related information processing. This COLL+META technique was thus developed to enhance positive interdependence and collaborative skills, which were necessary skills for collaborative writing. The current study also contributes to this research area by exploring the acquisition of academic writing skills. First, possessing academic writing skills is associated with academic writing performance. Measuring academic writing skills applies to Spivey’s (1990) description of necessary skills for academic writing: selecting, organizing, and connecting information. Second, the ability to synthesize ideas from sources, such as scientific texts, is dependent on the writer’s interpretation of related segments and coherence in the text (Sanders & Sanders, 2006). Student writers need to present information coherently. This task falls within the development of academic writing, for which learners must acquire information about cognitive processes, employ memory retrieval, and evaluate obtained information for a target academic audience (Negretti, 2012). Specifically, this study attempts to address the following research questions:

1. To what extent does the acquisition of academic writing skills differ among the four conditions (COLL+META, META, COLL, and CG)?
2. Which group demonstrated the best performance in terms of academic writing skills?

### 3 | METHOD

#### 3.1 | Participants

The present study involves learners and teachers from a university in mainland China. The learners were 160 EFL students attending a Chinese university in the southern part of China. Among the 160 students, there were 64 males and 96 females. Their majors included transportation, marketing, and business. They ranged from 18 to 20 years old. They were enrolled in an academic writing program for non-English-major students and all were in the first semester of their third year at the time of the study. They had completed four semesters of English learning consisting of 32 periods per semester (two
classes per week for 16 weeks). Their first language is Mandarin Chinese and English was learned as a foreign language.

Initially, 270 students agreed upon the invitation. However, 50 students were not available for the experiment schedule. Sixty students who earned fewer than four or more than six points out of nine in a writing test were excluded. This writing test was a standardized school test, which was used to examine whether significant differences among the four groups were present. This test was designed, supervised, and scored by all teachers in the College English department. The scores ranged from four to five on a nine-point scale based on the IELTS (or B2 based on CEFR), indicating an intermediate proficiency. The 160 participants were gathered and then equally and randomly divided into the four condition groups. An equal gender mix was arranged so that each group included 16 males and 24 females. The level of writing proficiency was determined before beginning the study. As measured through the writing test, the differences in writing proficiency among the four groups were not significant ($p = .71, \text{n.s.}$). The Cronbach's alpha for the writing test was .78, indicating robust reliability.

This study was approved by the department, so students who participated in this study could gain extra credits for their school performance. The participants signed a consent form; they were not informed about the nature of the experiment but were told they would need to complete some writing exercises. Teacher participants were selected on a voluntary basis. An invitation was sent to the nine teachers responsible for the academic writing course, four of whom expressed interest in the study. All were female teachers with about 6 years of experience in teaching academic writing. Each held a master's degree in English education. Each teacher was responsible for one condition.

### 3.2 Research context

As mentioned above, the students had already attended four semesters of English learning course. English writing, along with speaking, listening, and reading, constituted a required portion of college English teaching. Writing exercises were mostly completed independently. Students’ exposure to academic English texts had been largely limited to textbooks; metacognitive knowledge in self-regulating academic writing was not often addressed. This study involves four conditions. The training sessions were incorporated into an academic writing course. This course was designed to improve university students’ academic writing and was conceived as an intensive, semester-long course.

The conditions for the academic English writing course were as follows: (a) the course was compulsory, (b) its curriculum included authentic writing exercises, and (c) it was the only English course available in the semester during which the study was conducted. The students did not have opportunities to practice English writing directly or indirectly in other courses. In this writing course, students learned (a) a process approach to writing that included brainstorming, planning, and drafting; (b) micro-skills of writing, such as text structure and how to summarize; (c) basic paraphrasing skills; and (d) multiple essay types. In addition, course teaching involved a scaffolding approach (Hyland, 2003). For example, the initial stage involved more guidance from the teacher, whereas a subsequent stage involved more peer collaboration and independent analysis. In the course, students were exposed to research-based writing from different disciplines so they could become familiar with differences in rhetorical organization and style relevant to cross-disciplinary genres (Swales, 1990).

### 3.3 Conditions

As mentioned above, the participants were gathered and then equally and randomly divided into the four condition groups, namely (1) collaborative writing with embedded metacognitive guidance (COLL + META), (2) metacognitive training without collaborative writing (META), (3) collaborative writing without metacognitive training (COLL), and (4) individual learning (CG). During the semester (16 weeks), the four groups attended two 50-min training periods per week. The first 4 weeks were writing instruction for the four conditions. This schedule was in accordance with the writing curriculum suggested by the College English department. While all students in the aforementioned groups practiced the same writing tasks and used the same textbook, the instructional methods and materials were specific to the unique components for each condition.

#### 3.3.1 COLL+META condition

The use of “COLL+META” was first proposed in previous studies (Bol et al., 2012; Kramarski, 2004). Metacognitive guidance included metacognitive prompts related to knowledge and regulation of metacognition (Appendix A). The prompts consisted of a series of self-addressed metacognitive questions pertaining to comprehension, strategy, connection, and reflection. The focus of all prompts was on writing. The metacognitive prompts were provided in the students’ worksheets as well as in the teacher’s guide. They were used by group members, while the teacher relied on them when introducing new concepts or tasks, summarizing the lesson at the end of the period, or providing small-group help. The students were encouraged to answer these metacognitive questions while working on the task to facilitate their understanding of the nuances of writing. During the learning process, the teacher occasionally listened to one or two teams to check whether the learners actually answered these questions and used the guides. Appendix B shows an example of a writing task with the use of metacognitive prompts. As shown in Appendices A and B, the metacognitive prompts mainly oriented the learners to plan, monitor, and evaluate their writing process, and build metacognitive knowledge in writing, including understanding genre and professional academic prose. The metacognitive prompts also encouraged learners to compare the text features, structures, and organization in light of intended discourse community. Learners also received instruction on collaborative writing (Appendix C). The underlying pedagogical rationale was
that providing metacognitive prompts in collaborative writing would contribute to raising the learners' metacognitive and genre awareness and would better help them to produce their own research-based essays.

Students in the COLL+META condition self-selected the dyads. They stayed with the same partners during the whole process. They used the metacognitive prompts to complete their writing tasks. Typically, each period was composed of three sections. First, the teacher spent 10 min modeling the tasks required for the period while using the metacognitive prompts. The second section was designated for group work, whereby students were given 30 min to complete the writing task, guided by the metacognitive prompts. Group work mainly included planning, drafting, reviewing, and revising. For example, the learners planned and outlined the task together, after which each student worked on his or her part before the group compiled their individual parts and revised the entire document together. In this think-write-pair-share process, learners were encouraged to appreciate the value of individual contributions to the cooperative learning effort. During the third part of class, which lasted 10 min, the teacher used the metacognitive prompts to summarize task performance and identify the key difficulties encountered in collaborative writing.

### 3.3.2 META condition

The students in the META condition received the same metacognitive training as the COLL+META group; however, they worked on the writing tasks individually. Metacognitive training in the present study refers to the learning sessions for developing learners' metacognitive awareness or strategies related to academic writing. Similar to the COLL+META condition, the teacher spent the first 10 min instructing the group. The writing task was introduced by modeling the metacognitive question-answer technique. For instance, the teacher began by answering questions such as “What am I supposed to do in this task?” and “What do I already know about it?” The teacher then modeled strategies for completing the task and explained why these strategies were likely to be effective. Students were also instructed on how to check their writing output and what to do if their plan did not proceed as expected. Students then spent the next 30 min working on the writing task individually while being guided by the metacognitive prompts, which were printed in their booklets. Students were allowed to seek the teacher’s help if needed. Then, the teacher spent the remaining 10 min of the period reviewing the task using the metacognitive prompts and commenting on students’ performance.

### 3.3.3 COLL condition

In this condition, students self-selected the dyads to collaborate on the writing task. The procedures (Appendix C) for the collaborative writing followed Yarrow and Topping (2001). However, they did not receive any instruction on metacognition. The students were paired with the same person throughout the whole process. Once again, the first 10 min of a period were reserved for introducing the writing task to the entire class. Teachers’ presentations in the COLL condition were identical with COLL+META except for the meta prompts. During the next 30 min, the students worked on their writing tasks in pairs, similar to the COLL+META condition. The students in the COLL condition co-wrote a text. Each student was responsible for one part and shared with each other after writing. The dyad members compiled individual contributions and revised the written product as needed. Students in a collaborative writing session did not consult or share the prompts. If dyad members could not come to a consensus, students discussed the issue until disagreements were resolved. The points of discussion were finalized, and the agreed-upon solution was written down. When none of the members knew how to complete the task, they asked the teacher for assistance. The teachers randomly observed some pair work to see if the learners were discussing the task, explaining it to each other, approaching it from different perspectives, balancing perspectives against each other, and proceeding according to what seemed to be the best option. The teacher monitored dyad work and provided help to the students in need. For the third part of the period, the teacher conducted a 10-min review of the whole class’s performance and explained how to check the writing task and manage writing difficulties.

### 3.3.4 CG

CG in the present study was based on the instruction of the academic writing course. The course content included essay structure, paragraph structure, coherence, sentence structure, grammar, vocabulary, spelling, and mechanics. As mentioned above, the other conditions received this type of course instruction during the first 4 weeks. The students in CG learned individually without metacognitive guidance. For example, the students were exposed to a 10-min preparation stage in which the teacher explained the writing task to the entire group. Then, the students were encouraged to conduct the writing task independently without any metacognitive guidance, although they could seek help from the teacher as needed. This part lasted 30 min. In the last 10 min of the class, the teacher summarized the task and reviewed students’ challenges in completing it.

Table 1 summarizes the similarities and differences among the four conditions.

### 3.4 Learning materials

For this study, two sets of learning materials were developed. One set included the metacognitive prompts (Appendix A), which were prepared for the COLL+META and META conditions, while the other set included general instructions related to writing, such as (a) how to brainstorm, plan, and draft; (b) how to use evidence to support ideas; (c) how to organize text structure; (d) how to paraphrase and summarize; and (e) different types of essays. This set of materials was used for all conditions.
The rationale for measuring academic writing skills is in accord with Spivey's (1990) description that the acquisition of academic writing skills is based on selecting, organizing, and connecting information. Following Wischgoll's (2016) assertions, the present study explores four sub-sections: the reproduction of text structure knowledge, application of text structure knowledge, reduction of text content, and abstract writing. The tests on academic writing skills were administered before and after the treatment.

First, to measure the reproduction of text structure knowledge, students were required to write transitions that matched the text structure. For example, in a compare and contrast structure, students should use words such as “however,” “even though,” “in contrast,” “similarly,” and so forth. Five types of text structure were presented, including description, order/sequence, problem/solution, cause/effect, and compare/contrast. The students were required to write one omitted transition word for one paragraph, which was selected from a specific type of text structure. A total of 20 gaps were presented for the learners to fill in with the five types of text structure.

Second, to measure skills related to the application of text structure knowledge, learners were required to assign typical phrases to paper sections. The six sections included the introduction, literature review, method, results, discussion, and conclusion. Students were provided with a list of 20 phrases and required to assign them to each appropriate paper section.

Third, to measure skills in reducing text content, students were required to provide 20 key sentences. The sentence writing was in the form of bullet points that conveyed the key information and findings of a short article. The learners were provided with four short articles and were required to write five key sentences for each short article. The purpose was to evaluate students’ ability in capturing the novel results of the research.

Finally, the learners were required to compose an abstract for an empirical paper. The abstract serves as a point of entry for an academic article, is a challenging part of academic writing and is consequently used as a measure for evaluating learners’ success in academic writing. One scientific text was given to the learners as a

### 3.5 Teacher training

The method for teacher training entailed discussions and trainer modeling. Four teachers discussed and reached a consensus on the teaching materials, pedagogical issues, lesson plans, use of examples, and writing tasks for the writing instruction. The conditions were randomly assigned to the teachers, with one teacher being responsible for one condition. It is worth noting that assigning students to the four conditions with different teachers may have introduced potential confounding variables related to teacher characteristics. I attempted to minimize this possibility by ensuring that the four groups were similar in their pre-test writing aptitude, teacher background, and supervision to ensure adherence to the instructional methods. Each teacher was well trained in the condition to which she was assigned. For example, the teacher for the COLL+META condition received training on the rationale and techniques of metacognitive guidance and collaborative writing; the teacher for the collaborative writing condition was introduced to the rationale for and techniques of collaborative writing; the teacher for the META condition received training on metacognitive learning; and the teacher for the CG was not given any training on metacognition and collaborative writing but was given the same course instruction as the other teachers. The author designed the teacher training protocol, but the training was administered by an independent trainer who had taught English for more than 10 years. The trainer also provided comments on the materials for metacognitive instruction and collaborative writing.

### 3.6 Measures

The rationale for measuring academic writing skills is in accord with Spivey's (1990) description that the acquisition of academic writing skills is based on selecting, organizing, and connecting information.

### Table 1 Similarities and differences for the four treatment conditions

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Similarities</th>
<th>Differences</th>
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<tbody>
<tr>
<td>COLL+META</td>
<td>(a) The four conditions were implemented in a writing course; (b) The participants received similar writing exercises and the same textbooks covered for the course; (c) An experienced English writing teacher received training and worked as an independent instructor for each condition.</td>
<td>COLL+META: Students self-selected the dyads and spent 24 periods on the specific training on metacognitive learning and collaborative writing. Each period includes 10 min of teacher modeling, 30 min of student practice, and 10 min of teacher summary and self-reflection.</td>
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<td>META</td>
<td>(d) The four conditions were assigned with similar amount of time (two hours one week, and 16 weeks in total) allocated for each condition; The first four weeks, which include eight periods, were writing course instruction for the four conditions.</td>
<td>META: Students spent 24 periods on metacognitive guidance; however, they worked on the writing tasks individually. Each period includes 10 min of teacher modeling, 30 min of student practice, and 10 min of teacher summary and self-reflection.</td>
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<tr>
<td>COLL</td>
<td>(e) The participants received the same assessment methods (pre-test and post-test).</td>
<td>COLL: Students self-selected the dyads and spent 24 periods on the specific training on collaborative writing. Each period includes 10 min of teacher modeling, 30 min of student practice, and 10 min of teacher summary and self-reflection.</td>
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<tr>
<td>CG</td>
<td></td>
<td>CG: The students in this condition learned individually without metacognitive guidance. The students spent 32 periods for the learning. In each period, the students were exposed to a 10-min teaching modeling, then 30 min of self-writing practice, and then 10 min of teacher summary and student reflection.</td>
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</tbody>
</table>
handout. Considering time constraints and the learners' cognitive capacity, the sections in the article—introduction, literature review, method, results, and discussion—were reduced to about 400–500 words each. This short scientific paper included approximately 2500 words. Any content outside these five sections was omitted. A complete academic article including all sections was given to the participants so they could write an abstract based on the reading. Participants were informed they would be required to write a coherent abstract of no more than 150 words for this empirical study. Texts produced in class were not used to assess writing because students' recall from familiarity with texts could contaminate the results. There were no direct similarities between what students wrote in the intervention and the test. The research focus concerned whether students could transfer what they had learned in the intervention to meet the requirements of the assignment.

### 3.7 Scoring system

To measure reproduction of text structure knowledge, application of text structure knowledge, and reduction of text content, participants' written answers were rated as either correct or incorrect. The students received a score of one for a correct answer and zero for an incorrect answer. However, for the test of reduction of text content, learners could receive partial scores for providing a sentence with satisfactory information that included some minor grammatical errors (e.g., “Along with storybooks available online, students develops a subsequently great sense of enjoyment of reading.”). The total score for reproduction of text structure knowledge, application of text structure knowledge, and reduction of text content was 20 points, respectively.

The scoring scheme for measuring abstract writing consisted of four components: task response (e.g., the degree to which the task requirement has been met properly), coherence and cohesion, lexical resource, and grammatical range and accuracy. This scoring scheme was a standard rating scale based on the IELTS. The reason for using this scale was because the raters were familiar with the IELTS writing scale. The criteria were weighted equally, and the score was averaged. The rating system used a 20-point scale, following writing test practices used by the participating students' university.

### 3.8 Internal consistency and reliability of measures

The present study uses Cronbach’s alpha coefficient to compute internal consistency for the measures. In terms of measuring academic writing skills, the reliability indices for the pre-test were $\alpha = .71$ (reproduction of text structure knowledge), $\alpha = .76$ (application of text structure knowledge), $\alpha = .75$ (reduction of text content), and $\alpha = .76$ (abstract writing). In addition, the reliability indices for the post-test were $\alpha = .75$ (reproduction of text structure knowledge), $\alpha = .78$ (application of text structure knowledge), $\alpha = .77$ (reduction of text content), and $\alpha = .78$ (abstract writing). The values indicated an acceptable reliability for the tests (Meyers et al., 2006).

### 3.9 Training for the raters

Three experienced teachers were invited to mark the completed tests. They were unaware of the manipulation and the intent behind the study and did not participate in teaching the four groups. The raters attended a training session administered by the author prior to marking students' work. The raters were trained using anchor papers. They rated the three essays together, discussing final ratings, and rationale. While evaluating, two raters marked the answers independently first; they were not informed whether answers were from the pre-test or the post-test. When discrepancies occurred between the first two raters, a third rater was consulted. The decision on the final score was made based on majority opinion. Unanimous inter-rater agreement was observed for the metacognitive measure. The inter-rater reliability for the measures ranged from 93.1% to 96.8% (see Appendix D). The intraclass correlation coefficient (ICC) was calculated based on average measures, that is, the reliability of all three raters averaged together. The ICC value was 0.918, indicating sound reliability of ratings.

### 3.10 Procedure

As mentioned earlier, 160 EFL students participated in this experimental study. The same test for measuring academic writing skills served as both pre-test and post-test. This experimental study lasted 16 weeks. All students were administered post-tests immediately after the treatment. During the 16 weeks, the writing course they attended was the only English course offered during that semester. Participants in the Chinese university EFL context were unlikely to receive English writing instruction during the intervening learning that occurred between pre- and post-tests.

Each teacher instructed a group according to the instructional method to which she was assigned. The materials were specifically designed for each condition. The author monitored the study for one period per week for each group. A brief discussion was also held with the teachers after each monitoring period to ensure the instruction had been implemented as designed. After the training, students were given the same diagnostic tests they had received prior to the study. All tests were completed in a paper-and-pencil format, and students were allowed to finish them at their own pace.

### 3.11 Data analysis

The first purpose of the current study was to investigate the differential effects of COLL+META, META, COLL, and CG on academic writing skills. The four variables—that is, reproduction of text structure knowledge, application of text structure knowledge, reduction of text
knowledge structure, and abstract writing—largely conformed to the MANOVA requirement of correlations between them, which ranged from .35 to .49, with only one correlation between the first two variables at .49. It is assumed that multicollinearity could be avoided and MANOVA could be applied for this set of data (Meyers et al., 2006). In addition, the MANOVA analysis assumes normality and equality of variance of residuals. These assumptions were tested either statistically or graphically. Normality was statistically examined using a Shapiro test and graphically by analyzing the boxplots of residuals. The p value for the Shapiro test was greater than 0.05. The null hypothesis that the data are normally distributed was not rejected. All groups appeared normally distributed. In addition, the p value for the Box's test of the assumption of the equality of covariance also exceeded .05. The data thus met the assumptions for running MANOVA.

4 | RESULTS

Table 2 presents the means and standard deviations of test scores for academic writing skills in each condition (pre-test).

As shown in Table 2, prior to the beginning of the study, the total scores in the four conditions ranged from 3.98 to 6.50. In relation to the sub-scales, the total scores ranged from 4.75 to 5.08 for reproduction of text structure knowledge, 5.55–6.10 for application of text structure knowledge, 3.98–4.30 for reduction of text content, and 5.95–6.50 for abstract writing. These scores reveal that participants had some prior knowledge about academic writing skills, but their knowledge was not substantial. In terms of pre-test scores, the ANOVA did not reveal significant differences across the conditions for the reproduction of text structure knowledge (F(3, 156) = .807, p = .492), application of text structure knowledge (F(3, 156) =1.868, p = .137), reduction of text content (F(3, 156) =1.450, p = .230), and abstract writing (F(3, 156) = 1.933, p = .127).

Table 3 presents the means and standard deviations of test scores for academic writing skills in each condition (post-test).

As shown in Table 3, after the intervention, differences across the four conditions were detected (6.18–17.80). In relation to the sub-scales, the total scores ranged from 8.18 to 16 for reproduction of text structure knowledge, 9.9–17.80 for application of text structure knowledge, 6.18–13.13 for reduction of text content, and 8.15–16.05 for abstract writing. These differences reveal that participants in the four conditions had acquired some knowledge about academic writing skills.

The next step was to run the MANOVA for the post-intervention test scores. Based on Box's test of the assumption of the equality of covariance matrices (Box's M = 27.274, df1 = 18, df2 = 68 385.52, F = 1.456, p = .095), the p-value (which exceeded .05) showed that the statistic was non-significant and the MANOVA assumption of homogeneity of variance–covariance was not violated. Hence, the covariance matrices were roughly equal as assumed. The next step was to adopt Wilks' Lambda as the test of the F-statistic in MANOVA to examine main and interaction effects. Results are presented in Table 4.

Table 4 shows a significant effect of COLL [Wilks’ lambda = .050, F (4, 153) = 728.693, p = .000, ηp2 = .950] and META [Wilks’ lambda = .171, F (4, 153) =184.802, p = .000, ηp2 = .829] along with a significant interaction effect of COLL and META on test scores [Wilks’ lambda = .901, F (4, 153) = 4.210, p = .003, ηp2 = .099].

The next step was to analyze the results for Levene’s tests of equality of variances. Results were not significant for the four subsections (p > .05). These findings indicate that the multivariate test statistics were robust, and it was thus necessary to report the univariate results (Table 5) (i.e., “tests of between-participant effects”) to identify the significance of the independent variables on each dependent variable.

Table 5 lists the main effects of COLL on reproduction of text structure knowledge (p = .000, ηp2 = .800), application of text structure structure knowledge, and abstract writing. In terms of pre-test scores, the ANOVA did not reveal significant differences across the conditions for reproduction of text structure knowledge (F(3, 156) = .807, p = .492), application of text structure knowledge (F(3, 156) =1.868, p = .137), reduction of text content (F(3, 156) =1.450, p = .230), and abstract writing (F(3, 156) = 1.933, p = .127).

**TABLE 2** Means and standard deviations of test scores for academic writing skills and writing performance for each condition (pre-test)

<table>
<thead>
<tr>
<th>Tests</th>
<th>Groups</th>
<th>N</th>
<th>M</th>
<th>Std.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproduction of text structure knowledge</td>
<td>COLL+META</td>
<td>40</td>
<td>4.75</td>
<td>1.276</td>
</tr>
<tr>
<td></td>
<td>COLL</td>
<td>40</td>
<td>5.08</td>
<td>1.289</td>
</tr>
<tr>
<td></td>
<td>META</td>
<td>40</td>
<td>4.75</td>
<td>1.104</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>40</td>
<td>4.95</td>
<td>.749</td>
</tr>
<tr>
<td>Application of text structure knowledge</td>
<td>COLL+META</td>
<td>40</td>
<td>5.98</td>
<td>1.271</td>
</tr>
<tr>
<td></td>
<td>COLL</td>
<td>40</td>
<td>5.55</td>
<td>.846</td>
</tr>
<tr>
<td></td>
<td>META</td>
<td>40</td>
<td>6.10</td>
<td>.955</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>40</td>
<td>5.93</td>
<td>1.248</td>
</tr>
<tr>
<td>Reduction of text content</td>
<td>COLL+META</td>
<td>40</td>
<td>3.98</td>
<td>.733</td>
</tr>
<tr>
<td></td>
<td>COLL</td>
<td>40</td>
<td>4.30</td>
<td>.883</td>
</tr>
<tr>
<td></td>
<td>META</td>
<td>40</td>
<td>4.08</td>
<td>.829</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>40</td>
<td>4.00</td>
<td>.641</td>
</tr>
<tr>
<td>Abstract writing</td>
<td>COLL+META</td>
<td>40</td>
<td>6.18</td>
<td>1.035</td>
</tr>
<tr>
<td></td>
<td>COLL</td>
<td>40</td>
<td>6.50</td>
<td>1.240</td>
</tr>
<tr>
<td></td>
<td>META</td>
<td>40</td>
<td>5.95</td>
<td>.783</td>
</tr>
<tr>
<td></td>
<td>CG</td>
<td>40</td>
<td>6.18</td>
<td>1.010</td>
</tr>
</tbody>
</table>
structure knowledge ($p = .000$, $\eta_p^2 = .794$), reduction of text content ($p = .000$, $\eta_p^2 = .757$), and abstract writing ($p = .000$, $\eta_p^2 = .874$). The results also revealed the main effects of META on reproduction of text structure knowledge ($p = .000$, $\eta_p^2 = .424$), application of text structure knowledge ($p = .000$, $\eta_p^2 = .626$), reduction of text content ($p = .000$, $\eta_p^2 = .503$), and abstract writing ($p = .000$, $\eta_p^2 = .574$). Significant interaction effects of COLL*META were found on reproduction of text structure knowledge ($p = .000$, $\eta_p^2 = .035$), application of text structure knowledge ($p = .000$, $\eta_p^2 = .031$), reduction of text content ($p = .000$, $\eta_p^2 = .035$), and abstract writing ($p = .000$, $\eta_p^2 = .038$).
structure knowledge ($p = .000, \eta_p^2 = .031$), reduction of text content ($p = .000, \eta_p^2 = .035$), and abstract writing ($p = .000, \eta_p^2 = .038$).

Post-hoc pairwise comparisons (Table 6) indicated that the COLL+META condition yielded significantly better results than the COLL, META, and CG conditions ($p = .000$), irrespective of dependent variables. Similarly, the COLL condition yielded significantly better results than the CG ($p = .000$), irrespective of dependent variables. The META condition also yielded significantly better results than the CG ($p = .000$), irrespective of dependent variables. Finally, significant differences were found between the COLL and META groups ($p = .000$), irrespective of dependent variables.

### 5 | DISCUSSION

The strength of the present study lies in the analysis of academic writing skills. The metacognitive instruction (META) and collaborative writing (COLL) groups each outperformed the CG in terms of academic writing skills. These findings substantiate research revealing the beneficial effects of either metacognitive training (MacArthur et al., 2015; Ong & Zhang, 2013; Santelmann et al., 2018) or collaborative writing (Li & Zhu, 2017; Storch, 2005) on EFL students’ writing performance. The present study further suggests that learners benefit most from a combination of metacognitive guidance and collaborative writing for the possible enhancement of academic writing skills.

In line with previous studies, metacognitive training may help students activate metacognitive processes and identify writing strategies (Conner, 2007). In particular, metacognitive training may enable EFL students to employ higher-order thinking skills and leverage regulatory skills to maximize their writing performance (Teng, 2016). As argued by Mevarech and Kramarski (1997), training through metacognitive prompts could guide students to reflect on strategy selection and activate prior knowledge. This practice could also help learners optimize resources at their disposal and identify strategies to monitor, evaluate, and reflect on writing output during and after a writing task. Consistent with the positive effects of improving writing performance through metacognitive training (Nguyen & Gu, 2013), metacognitive guidance may help learners build a repertoire of strategies from which they can draw while writing. As posited by Wischgoll (2016), metacognitive guidance may enhance writing because the

### TABLE 6 | Results of pairwise comparisons

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Mean difference (I-J)</th>
<th>Std. error</th>
<th>Sig.</th>
<th>Lower bound</th>
<th>Upper bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproduction of text structure knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG COLL</td>
<td>−4.950*</td>
<td>0.310</td>
<td>0.000</td>
<td>−5.779</td>
<td>−4.121</td>
</tr>
<tr>
<td>CG COLL+META</td>
<td>−7.825*</td>
<td>0.310</td>
<td>0.000</td>
<td>−8.654</td>
<td>−6.996</td>
</tr>
<tr>
<td>CG META</td>
<td>−1.825*</td>
<td>0.310</td>
<td>0.000</td>
<td>−2.654</td>
<td>−0.996</td>
</tr>
<tr>
<td>COLL COLL+META</td>
<td>−2.875*</td>
<td>0.310</td>
<td>0.000</td>
<td>−3.704</td>
<td>−2.046</td>
</tr>
<tr>
<td>COLL META</td>
<td>3.125*</td>
<td>0.310</td>
<td>0.000</td>
<td>2.296</td>
<td>3.954</td>
</tr>
<tr>
<td>COLL+META META</td>
<td>6.000</td>
<td>0.310</td>
<td>0.000</td>
<td>5.171</td>
<td>6.829</td>
</tr>
<tr>
<td>Application of text structure knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG COLL</td>
<td>−4.800*</td>
<td>0.275</td>
<td>0.000</td>
<td>−5.534</td>
<td>−4.066</td>
</tr>
<tr>
<td>CG COLL+META</td>
<td>−7.900*</td>
<td>0.275</td>
<td>0.000</td>
<td>−8.634</td>
<td>−7.166</td>
</tr>
<tr>
<td>CG META</td>
<td>−3.175*</td>
<td>0.275</td>
<td>0.000</td>
<td>−3.909</td>
<td>−2.441</td>
</tr>
<tr>
<td>COLL COLL+META</td>
<td>−3.100*</td>
<td>0.275</td>
<td>0.000</td>
<td>−3.834</td>
<td>−2.366</td>
</tr>
<tr>
<td>COLL META</td>
<td>1.625*</td>
<td>0.275</td>
<td>0.000</td>
<td>0.891</td>
<td>2.359</td>
</tr>
<tr>
<td>COLL+META META</td>
<td>4.725</td>
<td>0.275</td>
<td>0.000</td>
<td>3.991</td>
<td>5.459</td>
</tr>
<tr>
<td>Reduction of text content</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG COLL</td>
<td>−3.950*</td>
<td>0.284</td>
<td>0.000</td>
<td>−4.709</td>
<td>−3.191</td>
</tr>
<tr>
<td>CG COLL+META</td>
<td>−6.950*</td>
<td>0.284</td>
<td>0.000</td>
<td>−7.709</td>
<td>−6.191</td>
</tr>
<tr>
<td>CG META</td>
<td>−2.050*</td>
<td>0.284</td>
<td>0.000</td>
<td>−2.809</td>
<td>−1.291</td>
</tr>
<tr>
<td>COLL COLL+META</td>
<td>−3.000*</td>
<td>0.284</td>
<td>0.000</td>
<td>−3.759</td>
<td>−2.241</td>
</tr>
<tr>
<td>COLL META</td>
<td>1.900</td>
<td>0.284</td>
<td>0.000</td>
<td>1.141</td>
<td>2.659</td>
</tr>
<tr>
<td>COLL+META META</td>
<td>4.900</td>
<td>0.284</td>
<td>0.000</td>
<td>4.141</td>
<td>5.659</td>
</tr>
<tr>
<td>Abstract writing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG COLL</td>
<td>−5.075*</td>
<td>0.236</td>
<td>0.000</td>
<td>−5.704</td>
<td>−4.446</td>
</tr>
<tr>
<td>CG COLL+META</td>
<td>−7.900*</td>
<td>0.236</td>
<td>0.000</td>
<td>−8.529</td>
<td>−7.271</td>
</tr>
<tr>
<td>CG META</td>
<td>−2.000*</td>
<td>0.236</td>
<td>0.000</td>
<td>−2.629</td>
<td>−1.371</td>
</tr>
<tr>
<td>COLL COLL+META</td>
<td>−2.825*</td>
<td>0.236</td>
<td>0.000</td>
<td>−3.454</td>
<td>−2.196</td>
</tr>
<tr>
<td>COLL META</td>
<td>3.075</td>
<td>0.236</td>
<td>0.000</td>
<td>2.446</td>
<td>3.704</td>
</tr>
<tr>
<td>COLL+META META</td>
<td>5.900</td>
<td>0.236</td>
<td>0.000</td>
<td>5.271</td>
<td>6.529</td>
</tr>
</tbody>
</table>
growth of metacognitive regulation may sensitize learners to details and attune them to the connections between metacognition and academic writing. In a qualitative study (Negretti, 2012), metacognitive awareness may facilitate students’ abilities to adapt their strategic knowledge to the specific requirements of the task and take more initiative in learning to self-regulate their academic writing. Thus, learners’ attention may be oriented toward preparing for the writing process and generating text recursively, similar to Hunt’s (1970) cognitive chunking. For example, learners may expand the amount of information they can access, use, and remember by recoding and reorganizing information or by breaking text into smaller chunks to process it more efficiently.

Results indicated that collaborative writing may enable students to engage in peer interactions and motivate them to argue, reason, and negotiate while participating in writing-related discourse, corroborating previous findings (e.g., Yarrow & Topping, 2001). Collaborative learning in planning, drafting, reviewing, and revising may foster students’ capacity to pool ideas and provide feedback (Altstaedter, 2018), develop self-regulatory guidelines (Lam & Kapur, 2017), and detect discrepancies between the actual and intended level of text quality (Storch, 2005; Suzuki, 2008; Teng, 2019a,b). This process may help learners identify and solve problems that arise while writing. One reason for this result, as explained by Li and Zhu (2017), is that students’ joint efforts in text construction, for example, their mutual engagement in trying to understand language functions and apply scaffolding strategies, helped them develop clear rhetorical structures and coherence for academic writing. Therefore, collaborative writing appeared to benefit students’ writing performance because students in this condition may be more engaged with their writing and more willing to monitor their writing process. However, compared with the COLL+META condition, students in the COLL condition showed relatively lower scores. Learners in the COLL condition may need metacognitive prompts to facilitate collaborative writing.

With respect to the COLL+META treatment condition, findings were in line with my expectations. Students benefited from incorporating metacognitive guidance into collaborative writing, as learners in this condition outperformed their counterparts in either the COLL or META condition. Thus, metacognitive strategies and collaborative writing strategies may operate jointly for these students. Learners who had been exposed to COLL+META training may have distributed information processing to build rhetorical awareness, thus achieving better academic writing performance (Teng, 2016). These findings align with scholarship emphasizing that academic writing development functions in tandem with rhetorical awareness (Haas, 1994). In particular, developing academic writing skills is tied to an understanding of writing as a situated, communicative event defined by purpose and audience (Hyland, 2007). As argued by Santelmann et al. (2018), students who participated in collaborative writing reported the benefits of peer review and social support. Such benefits could minimize stress for learning academic writing and thus increase their metacognitive awareness of the writing process. Teng (2020a) also suggested group feedback based on metacognitive prompts could facilitate students to contemplate the steps or procedures they needed to take during the process of developing written arguments. Metacognitive prompts from peers may thus have encouraged learners to build an awareness of the rhetorical context, wherein they may have understood more about audience in academic writing. As Hyland (2010) argued, the notion of audience for writing is closely associated with writers’ awareness of a rhetorical context. Metacognitive guidance in collaborative writing also reflects Hyland’s (2010) argument that academic writing is dependent on “interpersonal negotiations in which writers seek to balance claims for the significance, originality and truth of their work against the convictions of their readers” (p. 550). One argument based on the present findings asserts that achieving a better understanding of the communicative and purposeful nature of academic texts relies on learners’ ability to use metacognitive prompts in collaborative writing to self-regulate their writing.

Molenaar et al. (2010) pointed out that students who collaborated in small groups found it challenging to regulate their learning process. The reasons may be due to students’ lack of metacognitive activities. In the present study, students in the COLL+META condition received feedback from others during their writing process. This feedback-receiving process may have potential for improving their metacognitive skills. The collaborative interactions that develop in dyads may offer opportunities for the student writers to evaluate their academic writing knowledge. In line with Bol et al. (2012), learners who were allowed to seek help from peers learned more than students who did not seek help and were higher in overall use of self-regulation strategies. In the present study, enhanced academic writing skills imply that a metacognitive-collaborative writing approach may help EFL students develop metacognitive awareness and accelerate their ability to self-regulate their writing by developing specific academic writing skills (i.e., reproducing text structure knowledge, applying text structure knowledge, reducing text content, and abstract writing).

Under metacognitive-collaborative writing guidance, different forms of elaborated feedback may help learners to acquire academic writing skills. This finding can be explained on the basis of Kellogg’s (2008) model of cognitive development regarding writing skills. According to this model, the development of written composition skills includes three stages: knowledge telling, knowledge transforming, and knowledge crafting. Metacognitive prompts in collaborative writing may have facilitated EFL student writers’ ability to use prompts to share what they know, transform what they know for academic communication, and craft what they know for peers’ benefit. This process may have also facilitated learners’ coordination in planning ideas, generating text, and reviewing ideas and text. Acquiring academic writing skills is a process involving observation and practice, through which EFL students’ academic writing skills increased (observation) and were consolidated (practice). Per Kellogg’s (2008) “cognitive apprenticeship” (p. 19), the acquisition of academic writing skills was related to social learning with peers (Rogoff, 1990). Under metacognitive-collaborative writing guidance, learners exposed to guided participation received feedback from a group member that helped them work through the writing prompts. This approach mirrored Vygotsky’s (1978) zone of proximal development, such that student writers can be encouraged to stretch their capacities and work at a
higher level to attain growth. The metacognitive-collaborative approach may support students in learning beyond their current level of development through observation and practice.

Observed enhancements in abstract writing suggest that a metacognitive-collaborative writing approach may help EFL students develop metacognitive knowledge related to genre-relevant aspects of academic communication. Peer-facilitated prompts during the writing process may have helped the learners develop declarative and procedural metacognitive awareness along with self-regulatory capacity in planning, monitoring, and evaluating writing. To some extent, the metacognitive-collaborative approach helped learners integrate metacognitive prompts and peer feedback from collaborative writing and apply awareness of writing strategies to abstract writing from reading a scientific text. The benefit of the metacognitive-collaborative writing approach in academic writing performance (i.e., composing an abstract from reading a scientific text) may be connected to what Cheng (2007) termed “recontextualization.” For example, learners might be able to develop the “ability not only to use a certain generic feature in a new writing task, but to use it with a keen awareness of the rhetorical context that facilitates its appropriate use” (p. 303).

That is, the metacognitive-collaborative writing approach helped EFL learners transfer generic features analyzed as part of their source reading into their own writing. The findings of the current study fit with the conceptualization of academic writing as a process of developing metacognitive awareness and a self-regulatory endeavor in understanding pragmatic dimensions of the text, including rhetorical and genre-related features, such as text structures, audience expectations, and rhetorical choices in response to the underlying purpose of the intended discourse community.

6 | CONCLUSION

The present study contributes to ongoing research in the field of metacognition and academic writing by adopting an empirical approach and a theoretical framework simultaneously. First, the COLL +META students were more successful than the other students in improving some basic writing skills and enhancing the quality of their abstract writing from a scientific text. The COLL+META condition may have helped learners achieve deeper information processing, develop more profound metacognitive awareness, and monitor and reflect on their writing processes.

Despite the meticulously designed experimental methodology, the present study contains certain unavoidable limitations. First, this study was limited to 160 tertiary-level students from the same ethnic group at a single university. Data collected from the 160 participants may apply only to certain groups or in certain circumstances. Future studies should involve more participants from different backgrounds.

Second, academic writing is a genre-based activity. Therefore, training students in genre-specific knowledge, which may help them develop a conscious understanding of the target genres (Negretti & Kuteeva, 2011), may be beneficial. Third, to some extent, some of the writing activities used in the present study relied relatively on reading and vocabulary skills. For example, the test that involved filling in a blank in a sentence with the appropriate transition word was inherently connected to reading and vocabulary knowledge, yet participants’ reading abilities were not measured. Finally, students were assigned to four conditions with different teachers. This might have created possible confounding variables. I attempted to reduce this confounding effect by ensuring that the four groups were similar in their pre-test writing achievements, teacher background, and teacher instruction to help ensure adherence to implementation of the instructional methods. However, a teacher complexity is unavoidable given that each teacher implemented just one of the interventions. Future studies could consider such limitations and determine whether the results are applicable within a different context.

In addition, future studies could evaluate whether the learners that have been working in groups and given metacognitive prompts can produce better independent writing in the future.

Despite these limitations, these findings suggest implications for the development of academic writing in a global context. First, metacognitive prompts in collaborative writing may encourage learners to exchange feedback when navigating planning, monitoring, evaluating, and reviewing activities. Results echo those of Santelmann et al. (2018) who found that well-structured collaborative activities were required for peer feedback to be effective. A seminar-based format for collaborative writing could be applied across any number of disciplines with advanced undergraduates. A number of guides on metacognitive and self-regulation strategies could also be adapted by instructors across disciplines to help their students develop skills for and awareness of the academic writing process. Second, student writers might benefit from peer feedback during collaborative writing. They need to be prepared for the text structure and genre of academic communication. Explicit instructions about the text structures that frame academic writing was helpful. Such instruction increased students’ awareness of what constituted good academic writing so that they could use these structures for writing different sections of an academic essay. Finally, academic writing requires content, lexical and morphological, syntactic, and discourse knowledge (Kellogg, 1994). Instruction about the value of metacognitive strategies may be necessary to activate students’ prior knowledge in developing writing, particularly when they need to learn, apply, adapt, and broaden metacognitive strategies for academic demands in writing. In future studies, designing and evaluating instructional practices to meet the needs of academic writing for the diverse student population is essential. Future studies can also triangulate quantitative and qualitative data to understand how incorporating metacognitive prompts into collaborative writing can help student writers increase their knowledge about writing strategies, develop their self-regulated capacity for setting goals, sustain their efforts, reflect on their progress, and, thereby, enhance their academic writing skills.

CONFLICT OF INTEREST

The author declares that he has no conflict of interest.

DATA AVAILABILITY STATEMENT

The paper reflects the author’s own research and analysis in a truthful and complete manner. Informed consent was obtained from all
individual participants involved in the study. A few participants of this study did not agree for their data to be shared publicly. However, the data that support the findings of this study are available from the author, upon reasonable request.

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REFERENCES


SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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