Academic English writing metacognition, behavioral engagement, and competence development among post-graduate students of Chinese agricultural universities

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Abstract

The mastery of academic English writing is crucial for post-graduate students worldwide, serving as a cornerstone for academic communication, publication, and professional advancement. Amidst growing acknowledgment of the significance of academic English writing proficiency, this dissertation aims to explore the relationships between academic writing metacognition, behavioral engagement, and competence development among Chinese agricultural post-graduate students. Employing a descriptive quantitative research design, the investigation gathered data from 385 post-graduate students across three agricultural universities of varying academic prestige in China through a structured questionnaire. The collected data were analyzed using the statistical software of SPSS to rigorously examine the responses of the questionnaire. The combined employment of mean analysis, ANOVA, and correlational analysis offered a comprehensive data analysis. The findings suggested that female respondents' outnumbering over the male respondents and the respondents' were even distribution in school type and year level, the respondents' overall agreement with all the subdomains under the three major variables, illustrated significant difference on each variable when grouped according to school type, year level, and academic English learning experience, and illuminated significant relationships between metacognition, behavioral engagement, and competence development in academic English writing. By highlighting the pivotal role of metacognition and behavioral engagement in academic English writing development, this dissertation contributes to a broader understanding of the academic writing development process and offers valuable guidance for curriculum developers, educators, and policymakers in crafting language learning program that addresses the specific needs of academic English writing among post-graduate students in Chinese agricultural universities.

Keywords: Academic English Writing, metacognition, behavioral engagement, competence development, Chinese Agricultural universities

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1. Introduction

Under the background of higher education internationalization, the major academic works, journal articles, research results are published in English all over the world. English is serving as the lingua franca for research publication, scholarly communication, and academic discourse. The mastery of academic English writing is crucial for post-graduate students worldwide, serving as a cornerstone for the dissemination of research findings, collaboration with the international academic community, and the advancement of one's academic and professional career. In the context of Chinese agricultural universities, the ability to write competently in academic English is not just a skill but a necessary tool for post-graduate students to participate in the global academic community, contributing to scientific knowledge, and addressing the pressing issues of agricultural development and sustainability.

In China, the Outline of National Medium and Long-term Education Reform and Development Program (2010-2020) officially suggested that more international talents should be trained by colleges and universities so that they may compete internationally and engage in international issues while also having a solid understanding of international academic regulations. Meanwhile, according to the Ministry of Education, professional English proficiency and scientific research abilities should both be enhanced by the reform of college English teaching. In 2014, the Chinese Ministry of Education issued the English Teaching Syllabus for Graduate Students, which clearly stated that training the ability of post-graduate students to study, research and communicate in academic English should be the focus of teaching. Therefore, it is inevitable to carry out academic English teaching to Chinese post-graduate students to meet the above requirements.

Being an Academic English teacher as well as the coordinator of academic English teaching curriculum with over 10 years of teaching experience in a Chinese agricultural university, the researcher found that for non-native English speakers, including post-graduate students in Chinese agricultural universities, achieving proficiency in academic English writing is fraught with challenges, which include linguistic barriers, differences in rhetorical and writing conventions, and the lack of sufficient training in English academic writing within their educational curriculum. Consequently, developing effective language learning programs to support these students' academic writing development is critical for their academic success and professional growth. Building on the established foundation that underscores the importance of academic English writing proficiency for post-graduate students in the global academic arena and recognizing the complexity of academic writing as a cognitive and behavioral endeavor, this dissertation seeks to unravel the intricate dynamics between three pivotal variables: metacognition, behavioral engagement, and competence development in academic English writing.

Metacognition, which was first proposed in the field of psychology, is now considered to have great influence on academic English learners' language performance (Cai, 2018). Metacognition can be defined as an individual's own reflections on their knowledge, experiences, and processes related to language, language learning, and language instruction (Haukås et al., 2018). Metacognition is essential to the general learning process whichis regarded as one of the most important factors influencing language learning success and has been widely accepted as a theoretical framework for studies on language learning and teaching. Linguists have dedicated themselves to research on metacognition and they have yielded many valuable results which not only enrich theories ranging from cognition to language strategies but also provide a brand-new angle from which researchers and learners can better understand target language and thus improve language learning (Teng & Huang, 2021).

Behavioral engagement, as one of the constituent dimensions of student engagement, has also received increasing attention in the field of English language studies. Behavioral engagement is the interaction process

between learners and the academic environment with the behavioral characteristic of dynamics, goals, flexibility, construction, and continuity. Students actively engaged in learning are said to demonstrate positive attitudes and behaviors (Smith, 2014). The degree of behavioral engagement will directly affect the classroom effect and curriculum performances as one of the most important reference indicators in teaching. The concerning of the behavioral engagement can intuitively judge the degree of the student's engagement in the course. Much behavioral engagement means that the student has put a lot of time, energy, and effort into the tasks. Exploring the student's behavioral engagement to academic English writing is beneficial for the teacher to evaluate the students and analyzing the influencing factors of the behavioral engagement will help academic English teachers to arrange a more appropriate teaching strategy.

Academic writing competence development is the specific competencies that learners used to achieve academic communicative purposes, including language knowledge, discourse knowledge and strategic ability in the specific field of academic writing (Wang, 2019). In contrast to other types of writing, academic writing depends more on outside knowledge sources and less on the writer's own knowledge base. To carry out different reasoning tasks, an academic article is presented in the proper linguistic form and discourse structure. Writers need to have knowledge of academic language, discourse structure of a research article, and knowledge of scientific thinking, which are the three major components of academic writing competence, which makes the academic writing different from personal or expressive writing (Hiver et al., 2019).

Despite the acknowledged importance of academic English writing skills, there remains a notable gap in research concerning the specific learning processes of post-graduate students in the agricultural domain in China. While existing literature highlights the importance of metacognition and behavioral engagement in academic writing, few studies have specifically focused on these aspects in the context of Chinese agricultural university post-graduate students. Therefore, it is of great significance and value to study the interrelations and go deep into the pursuing of academic English writing metacognition, behavioral engagement, and competence development among post-graduate students in Chinese agricultural universities. The findings of this study are expected to contribute to a broader understanding of the academic writing development process, empower students in Chinese agricultural universities to achieve greater success in their academic and professional endeavors, and ultimately offer valuable insights for educators, curriculum developers, and policymakers in the fields of foreign language acquisition, academic writing, and higher education.

Objectives of the Study - The purpose of the current study was to determine the relationship among academic English writing metacognition, behavioral engagement, and competence development among post-graduate students in Chinese agricultural universities to propose an effective language learning program to enhance academic English writing teaching and learning. Specifically, this study determined the writing metacognition of the respondents in terms of metacognitive knowledge, metacognitive process, metacognitive experience throughout the academic English writing learning; identified the behavioral engagement of the learners as participation, effort, academic challenge, self-regulation of academic English writing; assessed the academic English writing competence development of the respondents as to the academic language, discourse structure, and scientific thinking of academic English writing; tested significant relationship among the variables of academic English writing metacognition, behavioral engagement, and competence development; and proposed effective recommendations based on the results of the study.

2. Methods

The study employed a descriptive quantitative research design, aiming at systematically describing and quantifying the relationship among academic English writing metacognition, behavioral engagement, and competence development among post-graduate students in Chinese agricultural universities without manipulating the environment or the participants. The sample consisted of all together 385 post-graduate students enrolled in three Chinese agricultural universities of different school types. A stratified random sampling method was used to ensure representation across different institutions, majors, and years of studying academic English. The sample

size was determined based on statistical power analysis by the using of Raosoft to ensure the reliability and effectiveness of the results.

Questionnaire was used as the research instrument to achieve the research objectives in the current study. A structured questionnaire was developed based on the three major variables of the research, which was comprised of four main parts including the profile of the respondents, items adapted from existing validated scales customized for academic writing metacognition, behavioral engagement, and competence development. Furthermore, the questionnaire was validated through a pilot study with a small subgroup of the target population to ensure the reliability and validity of the instrument before the large-scale investigation. Distributing the questionnaire through online platforms that is commonly used by the target demographic, ensuring ease of access and completion. The research questionnaires were distributed electronically, utilizing online survey platform of Questionnaire Star accessible to the target respondents. The university mailing lists, academic social media groups, and departmental announcements were all utilized to reach the potential participants, adhering to ethical guidelines for confidentiality and consent. Efforts were also made to ensure a high response rate through follow-ups and incentives where appropriate.

The data were thus collected from the online platform and analyzed using the statistical software of SPSS to rigorously examine the responses collected via the questionnaire. Descriptive statistics were employed to summarize the data, including the descriptive statistics of profile of the respondents, the means analyses to assess the general states of the major variables, ANOVA (Analysis of Variance) to identify any statistically significant variations in the three variables among the subgroups of participants, correlation analyses to explore the strength and direction of the relationships among the three main variables.

3. Results and discussion

Table 1

Summary Table on Academic English Writing Metacognition

Indicators	Weighted Mean	Verbal Interpretation	Rank
Metacognitive Knowledge	3.38	Agree	1
Metacognitive Process	3.28	Agree	2
Metacognitive Experience	3.03	Agree	3
Composite Mean	3.23	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 1 presents the summary on academic English Writing metacognition regarding three subdomains of metacognitive knowledge, metacognitive process as well as metacognitive experience. Based on the overall mean of 3.23, it can be concluded that most of the respondents chose the option of agree, and the overall mean can be supported by the following explanations.

To start with, metacognitive knowledge got the highest mean of 3.38, which shows that the respondents agreement level of metacognitive knowledge is above the average level, and they have shown a rather robust belief and agreement with the importance of metacognitive knowledge and feel confident in their accumulation and competence of metacognitive knowledge. The Chinese post-graduate students involved in the study are relatively clear about the objectives, requirements, and rules in academic writing task, and they know their strengths and limits and can apply suitable strategies in a proper manner to achieve satisfactory results when engaged in writing performance. The results of the research correspond with Teng's empirical study in 2020 to explore metacognition and its relationship with writing performance. The study investigated the role of metacognitive knowledge and regulation in mediating writing performance and revealed that the scores on six parameters of metacognitive knowledge were positively correlated with EFL writing performance.

Second, metacognitive process received a mean of 3.28 and ranked second, suggesting the respondents' agreement with the indicators of this subdomain but not as strongly as metacognitive knowledge. It illustrates that the respondents are generally clear about the positive effects of metacognitive plan, control, and regulation, and

especially excel in metacognitive controlling process. Most of the respondents involved tended to make necessary preparations before the metacognitive process, take appropriate measures to monitor the metacognitive process and adopt positive attitudes to revise their works after the metacognitive process. Metacognitive processes are of great significance to foreign language writing performance (De Silva & Graham, 2015). Research have also been implemented to investigate the influences of metacognitive process on EFL learners' writing performance and found that successful language learners needed to improve their metacognitive process, for instance, activating knowledge, and monitoring and regulating their learning process metacognitively, to achieve better writing outcomes (Zhang & Zhang, 2022).

Lastly, metacognitive experience received a slightly lower rating of 3.03, indicating agreement but to a lesser extent compared to the subdomains of metacognitive knowledge and metacognitive process. The respondents still generally agreed with the indicators of this indicator, although the confidence or agreement level might be slightly lower. Students usually undergo positive or negative metacognitive experience before, during and after their academic writing process. A considerable number of respondents will experience negative feelings such as anxiety and depression before the writing process. They may feel distressed and depressed when confronted with problems, and their mood will even be affected if they encounter difficulties during the academic writing process. Nevertheless, after the writing task is finished, they will then feel relieved and have a sense of achievements which will have positive influence on the quality of the academic English writing product. Similar finding was also put forward from other research, Sun and Zhang (2021) systematically analyzed the relevant research in terms of the types and influencing factors of metacognitive experiences in second language writing at home and abroad and got the corresponding conclusions with the author's current research.

Table 2
Summary Table on Academic English Writing Behavioral Engagement

Indicators	Weighted Mean	Verbal Interpretation	Rank
Participation	3.51	Strongly Agree	1
Effort	3.40	Agree	2
Academic Challenge	3.32	Agree	4
Self-Regulation	3.35	Agree	3
Composite Mean	3.40	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 2 presents the summary on academic English writing behavioral engagement regarding four subdomains of participation, effort, academic challenge, as well as self-regulation. Based on the overall mean of 3.40, it is evident that the respondents generally agreed that they can act accordingly on the specified academic English writing situations which proves their engagement.

To start with, participation got the highest mean of 3.51, which shows that the respondents state of participation in academic English writing learning is far above the average level, and they are generally strongly agreed with the specific indicators of this subdomain. It shows that the Chinese post-graduate students involved in the study stands out in active participation and interaction in learning activities, especially in attending the learning activities on time at the specified time and location, joining in the decision making of the curriculum regulations and classroom activities, and actively responding to the requirements from the teacher. In addition, the respondents excel in the communication, discussion, and collaborative learning with teachers and peer students. In academic English writing, it is of great importance to encourage students' active engagement and increase their participation. By actively participating in the writing process, students develop critical thinking skills, deepen their understanding of subject knowledge, and develop self-confidence and self-expression.

Second, the subdomain of effort received a mean of 3.40 and ranked second, suggesting agreement but not as strongly as with the subdomain of participation. It illustrates that the respondent has demonstrated high involvement and recognition of persistence and concentration to academic writing tasks, including the understanding of the task contents, the completion of tasks ahead of schedule, more engagement of time, energy, and enthusiasm, and the active participation in the collaborative learning and seeking solutions for the difficulties

which will allow them to stay informed about the latest research trends and academic viewpoints and become familiar with different research methods and fields, further deepen their understanding of disciplinary knowledge.

Furthermore, the subdomain of self-regulation received a slightly lower mean of 3.35 and ranked third, suggesting agreement but not as strongly as with the subdomains of participation and effort. Academic English writing is with long time spans and complex task requirements. In the writing process, the learners may encounter difficulties and frustrations, and self-regulation as a complex series of positive and constructive processes in which learners play an active role in regulating their cognition, emotions, willpower, and behavior to achieve self-awareness, self-regulation, and self-development can help them maintain a positive learning attitude, enhance the confidence in writing tasks, discover their own writing habits and style, make adjustments and improvements as needed, and improve the effectiveness of their writing.

Lastly, academic challenge received the lowest rating of 3.32, indicating agreement but to a lesser extent compared to effort, participation, and self-regulation. The respondents still generally agreed with the indicators of this indicator, although the confidence or agreement level might be slightly lower than the other three subdomains. It can be seen from the data that a considerable number of respondents are able to actively face academic challenges in the process of academic English writing. When they are encountered with difficulties and problems, they could take positive action to solve the problems and maintain a positive attitude in this process, which will lead to a prominent academic performance in academic research and observations. However, as the lowest subdomain under the variable of behavioral engagement, it also indicates the fact that a proportion of respondents might perceive it unsatisfactory and challenging when facing with the difficulties and high requirements under this subdomain.

Table 3

Summary Table on Academic English Writing Competence Development

Indicators	Weighted Mean	Verbal Interpretation	Rank
Academic Language	3.32	Agree	2
Discourse Structure	3.36	Agree	1
Scientific Thinking	3.31	Agree	3
Composite Mean	3.33	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 3 presents the summary on academic English writing competence development regarding three subdomains of academic language, discourse structure as well as scientific thinking. Based on the overall mean of 3.33, it can be concluded that most of the respondents chose the option of agreement, and the overall mean can be supported by the following explanations.

Discourse structure got the highest mean of 3.36, which shows that the respondents state of discourse structure in academic English writing is above the average level, and they generally agreed on the specific indicators of this subdomain. Research articles typically have a standard structure to facilitate international academic communication, which is commonly known as IMRAD (introduction, method, results, and discussion). Although there are variations on this basic format, IMRAD is a formula for writing up, and it is a method to make the scientific article logical in structure. The high mean presented by the students in this subdomain suggests that the respondents have a certain level of knowledge and practical reserves in mastering the basic writing framework and structure of academic papers and the writing skills and precautions for each section.

Second, the subdomain of academic language received a mean of 3.32 and ranked second, suggesting agreement but not as strongly as with the subdomain of discourse structure. It illustrates that the respondent's high involvement and adequate knowledge of academic language in academic writing. Control over academic language is a requirement for writing research papers or literature reviews. Learning academic language is recognized as a challenging but necessary task for academic English writers. Therefore, academic language is essential for academic English writing as it provides a specific set of vocabulary, grammar, and discourse conventions within the academic community, and enables writers to effectively communicate their ideas, demonstrate their expertise, and contribute to the scholarly discourse within their respective fields of study.

Lastly, the subdomain of scientific thinking received a slightly lower mean of 3.31 and ranked lowest, suggesting agreement but to a less extent compared to the scales of discourse structure and academic language. The respondents still generally agreed with the indicators of this indicator, although the confidence or agreement level might be slightly lower than the other two subdomains. Academic writers may face challenges in developing scientific thinking competence. The process of developing this competence requires rigorous practice, critical analysis, and the ability to evaluate and synthesize complex information. It can be difficult for writers to navigate through vast amounts of academic literature, identify reliable sources, and effectively incorporate evidence into their writing. Additionally, developing scientific thinking competence requires honing skills such as logical reasoning, problem-solving, and analytical thinking, which may take time and effort to master. However, with persistence, exposure to diverse perspectives, and continuous engagement in academic discourse, writers can gradually enhance their scientific thinking competence and excel in their academic writing endeavors.

Table 4

Relationship Between Academic English Writing Metacognition and Academic English Writing Behavioral Engagement

Metacognitive Knowledge	r-value	p-value	Interpretation
Participation	.487**	0.000	Highly Significant
Effort	.521**	0.000	Highly Significant
Academic Knowledge	.495**	0.000	Highly Significant
Self-Regulation	.532**	0.000	Highly Significant
Metacognitive Process			
Participation	.530**	0.000	Highly Significant
Effort	.627**	0.000	Highly Significant
Academic Knowledge	.599**	0.000	Highly Significant
Self-Regulation	.640**	0.000	Highly Significant
Metacognitive Experience			
Participation	.366**	0.000	Highly Significant
Effort	.552**	0.000	Highly Significant
Academic Knowledge	.607**	0.000	Highly Significant
Self-Regulation	.487**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 4 presents the association between Academic English writing metacognition and academic English writing behavioral engagement. The computed r-values indicates a moderate direct correlation, and the resulted p-values were less than the alpha level. This means that there was significant relationship exists and implies that the better is the academic English writing metacognition, the better is the academic English writing behavioral engagement. The computed r-value in the table has indicated a moderate direct correlation between the two variables of academic English writing metacognition and academic English writing behavioral engagement, with the correlations being statistically highly significant (p < 0.01). This suggests that the respondents who demonstrate higher levels of academic Englishi writing metacognition tend to have better performance in academic English writing behavioral engagement, specifically, in all the subdomains of participation, effort, academic challenge as well as self-regulation. A highly significant relationship between academic English writing metacognition and academic English writing behavioral engagement can be explained by several factors.

To start with, metacognition involves being aware of one's cognitive processes, including the strategies used during writing. When students are conscious of their writing strategies and techniques, they are more likely to actively engage in the writing process. They can make deliberate choices about how to approach their writing tasks, which leads to increased behavioral engagement. In addition, metacognition involves setting goals and monitoring one's cognitive processes. When students engage in metacognitive processes related to academic writing, they often set specific goals for their writing tasks. These goals can include improving their writing skills, achieving higher grades, or mastering specific writing techniques. These goals serve as strong motivational factors that drive behavioral engagement in the writing process. Lastly, metacognition includes the ability to self-regulate one's learning and problem-solving. In the context of academic writing, this means that students with strong metacognitive skills are better at managing their time, planning their writing tasks, and staying organized. This

self-regulation contributes to increased behavioral engagement because it helps students maintain focus and stay on track with their writing assignments.

Similar findings can be figured out the support the current findings in the research. Renninger (2014) provided a comprehensive overview of motivation and self-regulated learning, emphasizing the role of metacognition in fostering motivation and engagement in academic contexts. Graham (2015) and colleagues discussed how metacognitive practices, such as formative assessment and self-monitoring, could improve writing engagement and outcomes. Hacker (2022) explored the relationship between metacognition and engagement in web-based learning environments, highlighting the importance of metacognitive strategies in promoting engagement.

Overall, the highly significant relationship between academic English writing metacognition and academic English writing behavioral engagement can be attributed to metacognition's role in promoting task awareness, goal-setting, and self-regulation. These metacognitive processes collectively contribute to increased behavioral engagement in the academic writing process, resulting in improved writing performance and outcomes. In summary, the statement implies a positive feedback loop: stronger academic English writing metacognition leads to increased academic English writing behavioral engagement, which, in turn, enhances metacognition and further improves writing outcomes. This cyclical relationship reinforces the idea that fostering metacognition in academic English learners can have a significant positive impact on their behavioral engagement in the academic writing process, ultimately resulting in better-written academic papers.

Table 5

Relationship Between Academic English Writing Metacognition and Academic English Writing Competence Development

Metacognitive Knowledge	r-value	p-value	Interpretation
Academic Language	.572**	0.000	Highly Significant
Discourse Structure	.601**	0.000	Highly Significant
Scientific Thinking	.539**	0.000	Highly Significant
Metacognitive Process			
Academic Language	.689**	0.000	Highly Significant
Discourse Structure	.664**	0.000	Highly Significant
Scientific Thinking	.581**	0.000	Highly Significant
Metacognitive Experience			
Academic Language	.573**	0.000	Highly Significant
Discourse Structure	.520**	0.000	Highly Significant
Scientific Thinking	.419**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 5 illustrates the association between academic English writing metacognition and academic English writing competence development. The computed r-values indicates a moderate direct correlation, and the resulted p-values were less than the alpha level. This means that there was significant relationship exists and implies that the better is the academic English writing metacognition, the better is the academic English writing competence development. The computed r-value in the table has indicated a moderate direct correlation between the two variables of academic English writing metacognition and academic English writing competence development, with the correlations being statistically highly significant ($p < 0.01$). This suggests that the better academic English writing metacognition a student possesses, the better their academic English writing competence development tends to be. The existence of a highly significant relationship between academic English writing metacognition and academic English writing competence development can be explained through several interconnected factors.

First, it has to be mentioned the process of the awareness of the academic writing metacognitive process, which includes planning, monitoring, and evaluating one's writing. Students with strong metacognitive skills are more conscious of how they approach writing tasks, which allows them to identify areas where improvement is needed. This heightened awareness is essential for competence development as it helps students pinpoint specific areas for growth. Second, metacognition involves seeking feedback and using it to improve. Students with strong metacognitive skills actively seek out feedback from peers, instructors, or self-assessment tools. They are more

likely to apply constructive feedback to revise and refine their writing, leading to competence development over time. Last but not for the least, metacognition encourages reflection on the writing process and outcomes. Writers who engage in reflective practice can critically assess their work, identify strengths and weaknesses, and develop strategies for improvement. This reflective process is iterative and promotes ongoing writing competence development.

Graham (2015) have arrived similar findings in his study, which reviewed research on the Self-Regulated Strategy Development (SRSD) model, which incorporates metacognitive strategies to improve writing competence, particularly in students with learning disabilities. Karpati (2015) explored the relationship between metacognitive skills and competence development in academic writing. In summary, the highly significant relationship between academic English writing metacognition and academic English writing competence development is based on metacognition's role in promoting awareness of writing processes, feedback utilization, as well as reflective practice. These metacognitive processes collectively contribute to the development of academic English writing competence development in the subdomains of academic language, discourse structure and scientific thinking in academic English writing by enabling students to continually refine their skills and produce higher-quality written work.

Table 6

Relationship Between Academic English Writing Behavioral Engagement and Academic English Writing Competence Development

Participation	r-value	p-value	Interpretation
Academic Language	.561**	0.000	Highly Significant
Discourse Structure	.543**	0.000	Highly Significant
Scientific Thinking	.506**	0.000	Highly Significant
Effort			
Academic Language	.709**	0.000	Highly Significant
Discourse Structure	.657**	0.000	Highly Significant
Scientific Thinking	.616**	0.000	Highly Significant
Academic Knowledge			
Academic Language	.737**	0.000	Highly Significant
Discourse Structure	.669**	0.000	Highly Significant
Scientific Thinking	.651**	0.000	Highly Significant
Self-Regulation			
Academic Language	.826**	0.000	Highly Significant
Discourse Structure	.757**	0.000	Highly Significant
Scientific Thinking	.714**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 6 displays the association between academic English writing behavioral engagement and academic English writing competence development. The computed r-values indicates a moderate direct correlation, and the resulted p-values were less than the alpha level. This means that there was significant relationship exists and implies that the better is the academic English writing behavioral engagement, the better is the academic English writing competence development. The computed r-value in the table has indicated a moderate direct correlation between the two variables of academic English writing behavioral engagement and academic English writing competence development, with the correlations being statistically highly significant (p < 0.01). This suggests that the respondents who demonstrate higher levels of academic English writing metacognition tend to have better self-assessment in academic English writing competence development, specifically, in all the subdomains of academic language, discourse structure, scientific thinking. The positive relationship between academic English writing behavioral engagement and academic English writing competence development can be explained through several key factors.

Behavioral engagement in academic writing, such as regular practice, active participation in writing assignments, and seeking feedback, directly contributes to the improvement of writing skills. The more students engage with the writing process, the more they develop their ability to articulate ideas, structure arguments, and use language effectively. For students writing in Academic English, particularly non-native speakers, regular

writing engagement is a keyway to develop language proficiency, including vocabulary, grammar, and overall fluency. Furthermore, engaging in various writing tasks exposes students to different styles, genres, and formats, enhancing their adaptability and broadening their writing competencies. Behavioral engagement often involves receiving and acting on feedback. This can be critical for competence development, as it allows students to understand their weaknesses and strengths. Revising their work in response to feedback helps students refine their writing skills. Third, success in academic writing tasks can reinforce the positive relationship between behavioral engagement and competence development. As students achieve better results, they are likely to engage more, creating a virtuous cycle of improvement.

Relevant findings collectively support the idea that behavioral engagement in academic English writing is closely linked to the development of writing competence. Lei and Cui's (2018) research underscored the impact of behavioral, emotional, and cognitive engagement on academic achievement, which aligned with the idea that active participation and involvement in academic writing tasks foster writing competence development.

In the context of writing, studies have emphasized the importance of engaging students in the writing process. Authentic writing tasks and providing opportunities for students to engage in meaningful writing activities are crucial for fostering writing engagement. This engagement, in turn, has been linked to improved writing skills, as it involves time on task, cognitive engagement in the early stages of the writing process, and a focus on the drafting stage where ideas are developed and articulated (Samantha et al., 2022). Furthermore, another research has found that academic enjoyment, behavioral engagement, self-concept, and organizational strategy can mediate the relationship between positive emotions and academic achievement in English as a Foreign Language (EFL) settings. This suggests that enjoyment and engagement in English learning, including writing, can directly and indirectly affect language competence and achievement (Kang, 2022).

To sum up, the positive relationship between engagement in academic English writing and the development of writing competence is multifaceted, involving skill improvement, feedback loops, motivational aspects, cognitive and language development, and the reinforcing nature of academic success. The better is the academic English writing behavioral engagement, the better will be the academic English writing competence development.

4. Conclusions

(1) The respondents agreed with all the subdomains of academic English writing metacognition, among which the agreement level of metacognitive knowledge was much higher than that of the subdomains of metacognitive process and metacognitive experience.

(2) The respondents agreed with all the subdomains of academic English writing behavioral engagement, among which the respondents state of participation was far above the average level, and academic challenge ranking lowing demonstrated their unsatisfactory assessment and performance faced with the difficulties and requirements of academic challenge.

(3) The respondents agreed with all the subdomains of academic English writing competence development, with the best performance on discourse structure, and the subdomain of scientific thinking received the lowest score and suggested difficulty and challenge for most academic English writing learners.

(4) The three variables of academic English writing metacognition, behavioral engagement, and writing competence development were highly significantly correlated with each other, suggesting that the better is the academic English writing metacognition, the better is the behavioral engagement; the better is the academic English writing metacognition, the better is the writing competence development; the better is the academic English writing behavioral engagement, the better is the writing competence development.

4.1 Recommendations

(1) Academic English teachers may take metacognition of the learners into consideration and enhance the

behavioral engagement of the learners by conducting interactive writing workshops and group project and at the same time improve the learners academic writing competence in academic language, discourse structure as well as scientific thinking abilities.

(2) Academic English learners may constantly enhance their metacognition by regular self-reflection and active feedback seeking, boost behavioral engagement by dedicated participation and deeply collaborative learning, improve academic writing competence by regular writing academic writing practices and better utilization of academic writing resources and techniques.

(3) Academic English Writing Enhancement Program coordinators may create and promote a comprehensive and dynamic writing enhancement program by focusing on tailored curriculum development, peer learning and mentorship programs, professional development workshops, which will not only improve teachers and students' academic writing teaching and learning skills but also engage them in the process of applying these skills in their academic research and professional pursuits.

(4) University administrators may integrate academic writing programs into the official curriculum, offer professional training for teaching faculties, provide access to academic writing resources and tools and create academic environment that not only supports the development of post-graduate students' academic writing skills but also encourages a deeper engagement with the academic writing process, which will promote significant improvements in students' academic writing metacognition, behavioral engagement, and overall writing competence.

(5) The proposed language learning program implementors may specify the specific objectives of the program through research and investigation, determine the implementation plan to improve and enhance the learners' academic English writing abilities, take systematic actions to gradually enhance the metacognitive ability of academic English writing learners, strengthen their behavioral engagement, train their writing strategies, and improve the implementation effect of the program through regular evaluation and adjustment.

(6) Future researchers may broaden the range of academic English writing in scope and consider potential research possibilities, such as the interdisciplinary approach, the multilingual and cross-cultural approach as well as the technology integration approach, which highlight the dynamic and evolving nature of the issue that can be addressed to significantly enhance academic writing practices, pedagogies, and policies, ultimately fostering a more inclusive, accessible, and innovative academic community.

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