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Navigating the Journey: A Phenomenological Exploration of Graduate Students' Experiences in Scientific Article Writing

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ABSTRACT

Writing scientific articles presents considerable challenges for many graduate students, often due to insufficient support and resources. As academic publishing is crucial for scholarly development, understanding the obstacles students face is essential for providing effective interventions. This qualitative study employed a phenomenological approach to explore the experiences of ten graduate students from diverse academic disciplines and semesters. Data were collected using semi-structured interviews, preceded by an e-reflection exercise completed by each participant. Interpretative Phenomenological Analysis (IPA) was used to examine the data, following steps such as identifying significant themes, interpreting their meaning, and synthesizing the findings. The analysis revealed three primary challenges in scientific writing: difficulty selecting a topic, poor time management, and limited academic writing proficiency. To overcome these issues, students engaged in peer discussions, developed task lists, and participated in scientific writing training programs. These findings highlight the need for structured writing support within graduate programs. Institutions should consider implementing targeted interventions, such as peer writing groups and academic writing workshops, to enhance students' writing competence and confidence. Graduate students encounter multifaceted challenges in scientific article writing. However, through collaborative strategies and institutional support, these obstacles can be effectively mitigated. Future research should further investigate scalable academic writing interventions to support student success.

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1. INTRODUCTION

Writing has played a significant role in improving people's critical thinking and articulating ideas clearly, especially among academics. However, researchers often find it challenging to simplify complex concepts into accessible forms (Bracewell, 2020; Yasuda, 2023;). Furthermore, some researchers recognize

the need to utilize technology to assist in the writing process and to create good sentences. One of the types of writing that academics compose is a scientific article.

Scientific articles contribute to the global body of knowledge, making them more impactful than other forms of academic writing (Farley, 2019). The researchers must improve the skills required for the effective writing and publication of their work (Birhan, 2021; Birhan & Nurie, 2024). Writing scientific articles requires researchers to simplify complex concepts. At the same time, they must maintain analytical depth to ensure accessibility for diverse readers. Furthermore, researchers must construct coherent sentences to help readers follow the logical flow of ideas. This ensures that readers remain oriented throughout the essay (Al-Ghabra & Najim, 2019; Khonamri et al., 2021; Saeed et al., 2022;). Achieving this balance highlights the significance of managing intrinsic cognitive load, that relates to the inherent difficulty of the material being written. Without effective strategies to address intrinsic load, researchers may struggle to communicate their ideas clearly and succinctly. In addition to intrinsic load, researchers must also manage extrinsic cognitive load, which includes factors external to the writing process, such as organizing and presenting reference data clearly.

Researchers often struggle to select professional yet straightforward language, particularly when writing in a second language, which requires a strong command of vocabulary and phrase usage (Gao & Min, 2021; Liu et al., 2020). Furthermore, a coherent structure and clear explanations are essential to avoid misinterpretation and ensure readers can follow the argument logically (Jr & Noe, 2019; Keller et al., 2024). In addition to clarity, the presentation of reference data, whether qualitative or quantitative, necessitates significant consideration to ensure that it is stated clearly. If not addressed, extrinsic cognitive load can burden readers. This may lead to misinterpretations and comprehension difficulties.

Comprehensive reading is essential for building well-supported arguments, especially when analyzing dense, information-rich texts (Osorio et al., 2023; Payant et al., 2019). The capacity to convey difficult readings into understandable and appealing arguments is an essential skill for researchers (Mallahi, 2024). Managing a large volume of reading materials also requires the capacity to synthesize and express essential ideas to the intended audience efficiently and succinctly. Researchers must also consider sentence form when delivering their views. Sentences that are too long or convoluted might obscure the clarity of the argument, making it difficult for readers to understand the intended point. Thus, researchers should strive for a balance, ensuring that sentence length and complexity are acceptable for the topic matter while maintaining academic formatting standards. Furthermore, while introducing new concepts, it is critical to present them within the context of previous knowledge.

Even though some studies have examined what must be emphasized when writing scientific articles, the challenges of writing scientific articles for graduate students are rarely addressed. Graduate students often face unique challenges in transitioning to the academic demands of publishing scientific articles, which differ from the experiences of undergraduate students or senior researchers. According to several experts, one issue is a lack of writing competence, which hinders their ability to conduct research and publish it in the form of scientific publications (Wragg et al., 2020). Other scientists have pointed out that graduate students struggle due to limited expertise from their prior level of study and an inability to maintain consistent writing habits (Born & Brock, 2023). Furthermore, existing research has largely focused on general writing challenges without exploring the specific intrinsic and extrinsic obstacles faced by graduate students. These challenges, such as limited prior exposure to academic writing, balancing writing with research responsibilities, and developing advanced research skills, remain underexplored.

Addressing these gaps is essential because the process of writing and publishing scientific articles significantly impacts the academic journey and career development of graduate students. While understanding the challenges they face is a crucial first step, identifying potential solutions is equally important. Solutions not only provide actionable strategies to mitigate these obstacles but also offer practical guidance for institutions, advisors, and students to improve their writing skills and academic productivity. Without exploring solutions, any effort to understand challenges remains incomplete and lacks the practical value needed to drive meaningful improvements in graduate students' academic writing outcomes.

This study seeks to fill this gap by examining the unique challenges faced by graduate students in writing scientific articles and identifying solutions to overcome those challenges. By exploring both intrinsic and extrinsic factors, this research aims to provide valuable insights that can inform educational practices and institutional policies to better support graduate students. The study addresses the following research questions:

1. What are the challenges faced by graduate students in writing scientific articles?
2. What are the solutions to overcome the challenges?

2. METHODS

This study employed a qualitative research design to investigate the challenges faced by graduate students in writing scientific articles and to identify solutions to overcome these challenges. A phenomenological approach was chosen to gain an in-depth understanding of the lived experiences of graduate students, focusing on how they perceive and navigate the complexities of academic writing (Creswell, 2014). This method was particularly effective in capturing the unique challenges and solutions that emerge in the context of graduate-level academic work.

The subjects in this study were graduate students from Yogyakarta State University, selected through purposive sampling. This sampling strategy was used to discover individuals with specific expertise, experience, and interest in the phenomenon being studied (Ajjawi & Higgs, 2007; Creswell & Plano Clark, 2011; Patton, 2015). Total of ten participants, all with prior experience in writing scientific articles and enrolled for at least one semester, were included in the study. Their majors, number of written works, and semesters were considered relevant as they provide insights into the participants' academic progression and the diversity of experiences in the context of scientific writing. For example, participants with more written works may have more experience overcoming the challenges of writing scientific articles, while those in different academic majors might face distinct challenges based on their field's specific writing conventions. The diverse academic backgrounds added depth to the data, illustrating how the writing challenges and solutions might vary across disciplines and experience levels. Table 1 presents the characteristics of the participants.

Table 1. Characteristics of the subjects

Code	Gender	Major	Semester	Number of written works
P1	Male	Basic education	3	6
P2	Female	English education	3	3
P3	Male	Applied Linguistics	3	4
P4	Female	Counseling guidance	2	5
P5	Female	Physic education	2	3
P6	Female	Basic education	3	4
P7	Male	Basic education	3	3
P8	Male	Science education	2	7
P9	Female	Science education	2	4
P10	Female	Applied linguistics	3	6

To collect the data, the researchers distributed e-reflection for around twenty-five graduate students. The form contained 10 questions regarding their perceptions and experiences in writing scientific articles.

For example, "what are the most significant challenges you face when trying to write a scientific article, and how do you overcome them?", "can you describe a specific moment during writing your scientific article where you felt challenged?". The interview questions were developed not only to correspond to the major research objectives, but also to elicit detailed information about the subjects' background, perspectives, opinions, and knowledge of the phenomenon under research (Jacob & Furgerson, 2012). The interview was conducted face to face, and the results were recorded and transcribed, capturing each subject's comments specifically. The semi-structured interview style was used to highlight the graduate students' challenges with scientific articles while examining potential solutions to their problems.

The researchers employed thematic analysis (TA) following the phases indicated by Braun and Clarke (2006). Initial transcription was followed by a thorough review to identify key patterns and themes. Rather than strictly following each phase of the analysis process, the focus was on interpreting the data in a way that reflected the participants' unique challenges. Themes were not only derived from recurring issues but also from individual differences, providing a comprehensive view of the various challenges faced by the participants. The final analysis emphasized the nuances of both the intrinsic and extrinsic (challenges, exploring how these factors interact and affect the writing process.

The researchers used four principles of Yardley (2000) including sensitivity to the context, commitment and rigor, transparency and coherence, and impact and importance to increase trustworthiness. Sensitivity to the context was shown by creating a comfortable environment for participants and tailoring questions to their background. Commitment and rigor were reflected in the thorough data review and cross-checking during analysis. Transparency and coherence were demonstrated by clearly documenting the analysis process, linking themes to the research questions. Impact and importance were emphasized by sharing the findings with participants and disseminating them to inform academic writing practices.

3. FINDINGS AND DISCUSSION

3.1. Challenges faced by graduate students in writing scientific articles

After reading the transcriptions several times to the transcriptions and listening to the recording of the interview, several themes were identified, including 1) Linguistic knowledge (lack of topic, lack of English, lack of academic writing knowledge, and research gap); 2) external relationship (data collection permission); 3) time management and references issues (time management and references); 4) journal issues (transparency of decision time and article processing charge). Based on the thematically analyzed data, the findings of this study regarding the challenges faced by graduate students in writing scientific articles can be summarized as shown below.

Table 2. Themes and sub-themes of challenges faced by graduate students

Themes	Subtheme(s)
Linguistic knowledge	Lack of topic
	Lack of English
	Lack of academic writing knowledge
	Research gap
External relationship	Data collection permission
Time management and reference issues	Time management
	References

Journal issues	Transparency of decision time Article processing charge

3.1.1 Linguistic knowledge

Our analysis reveals that producing scientific articles is challenging due to a lack of topics held by students. They admitted that they struggled to find uncommon and urgent problems to research, as well as ones with a substantial impact on their respective scientific disciplines. The problem in selecting topics is also related to the challenge of adjusting the scope of the target journal and the topic they want to address, which makes an effort to find a suitable topic to write more complex. In the first interview, for example, P1 stated.

> *"I often have difficulty finding ideas or research topics that are relevant and have urgency." (P1)*

P1 recognized that identifying topics for scientific articles is challenging. It requires significant quantities of research and reading to develop an innovative topic that will be of interest to the target journal. An original topic is essential since the research topic must be updated and different from other topics. However, some students still have difficulty identifying research gaps. Aside from a lack of topic, students struggle to identify research gaps. P4 recognized that the difficulties of identifying research gaps hindered their ability to conduct research.

> *"I have a hard time writing the background in an article. I have a hard time explaining the background like I do not know my research gap." (P4)*

P4 indicated that after finding a topic, P4 struggled to identify research gaps. P4 recognized that it was difficult to find the differences between current and earlier research. This encourages the researcher to improve the number of reading resources. Reading a large number of previous studies on the same scientific topic is one method for identifying a research gap. On the other hand, to understand previous research, students must have adequate knowledge of English, as most research is conducted in English. Meanwhile, students perceive their English is still inadequate, as reported by P7.

> *"I have difficulty in writing scientific articles because reputable journals mostly use English while my English is still very bad." (P7)*

P7 stated that a lack of comprehension of English makes it difficult for students to create scientific articles since they are unable to understand the content of the articles. P7 must spend more time understanding an article before identifying mistakes. Understanding English can improve an individual's academic abilities. Students who lack knowledge of English are more likely to feel pressured to publish scientific articles and have harder confidence. Students also recognized that a lack of academic writing knowledge made it difficult for them to express the ideas in the form of scientific articles, as stated by P2.

> *"In terms of writing in Indonesian, sometimes I still often use active sentences, but for journals, they usually recommend writing in passive sentences, or in reporting." (P2)*

The difference in writing style in Indonesian, namely between non-scientific and scientific articles, causes students to become confused while employing terminology. P2 demonstrated that a lack of academic writing required them to learn more about using academic language in scientific articles. Academic writing has a distinct style from other types of writing. In the current study, linguistic

knowledge plays an essential part in writing scientific articles. If the linguistic knowledge is inadequate, the process of writing scientific articles may take an extended time and involve more steps.

3.1.2 External relationship

Students also believe that relationships with third parties, such as those with institutions where data is collected, are one of the challenging aspects of writing scientific articles. Field study data must be obtained with the approval of the research subject. Students who write scientific articles must do research on data in both the library and the field. Almost all students struggle to collect data in the field since they must communicate and demand much energy and materials.

Before writing the article, P1 and P4 discovered they were having trouble coming up with topics and filling research gaps. This means students must have a variety of reading materials. After identifying ideas and research gaps, P7 and P2 encountered difficulties expressing their ideas in English and utilizing academic writing. Meanwhile, after the data gathering procedure, students encountered permission issues with the parties they asked to research, as stated by P8.

> *"When I collect data in the field, it requires permission and then adjusts the time from the school or campus, which means we have to use our own time, so we as researchers or researchers must obtain permission, which takes time." (P8)*

The process of adjusting the time between the researcher and the party being studied becomes a challenge, as the researcher is unable to collect data based on the time available. This is also a challenge because researchers must conform to the target journal's publication schedule. Finally, the students recognized that the data collection procedure takes a long time and involves significant labor and funding, so students must plan for everything they require, materially and otherwise.

3.1.3 Time management and reference issues

Writing scientific articles takes a long time, and researchers must balance their time between research and other tasks. In these conditions, students admitted that they had to manage their time between research assignments and other assignments, as writing scientific articles required a significant amount of focus time, and in some cases, students had multiple research assignments, necessitating time management. For example, P6 complained.

> *"In fact, I have made a to-do list for this time management, but sometimes it does not match the to-do list that I made because sometimes the tasks are beyond predictions, sometimes the tasks are added by the lecturer, and sometimes it still adds up. It's still a real culture shock with all assignments for this master's degree." (P6)*

P6 stated that was surprised by all the master's degree assignments that did not meet expectations due to the amount of work involved. Due to the number of assignments, students must allocate their time, which needs individual discipline. However, even if students have created a to-do list, the items they have planned may not match reality due to the addition of tasks over time. Making a to-do list helps students understand what needs to be done and finished. Aside from challenges with time management, students acknowledged having difficulty collecting references for their scientific articles, as highlighted by P5.

> "*I have difficulty finding references related to my research, for example, for Sinta 2, at least the references are also Sinta 2. I sometimes have difficulty finding those that are relevant to me. I find it difficult to find them in Sinta 2 or Scopus, but sometimes there are some references for example, I find this reference, but it is not indexed in Sinta." (P5)*

P5 tried to seek references from reputable journals that are relevant to the research being conducted. This means that students must have extensive access to reputable publications and be creative in their search for journals with open-access articles, either by contacting friends or professors with access to assistance. Quality references are those from reputable and trustworthy publications. The reference search is an attempt to support and prove the study being conducted, so readers can get a wealth of information from the many references used by researchers.

3.1.4 Journal Issues

Almost all students additionally claimed that the lack of transparency of decision time hindered their ability to write scientific articles and deterred them from conducting additional study. Writing and publishing an article requires a lot of time. Students must wait a long time for the journal's decision. However, because submitted studies have not received responses, students are less motivated to conduct additional study. According to P3, one of the motivations for writing research was due to receiving status of the articles that had been written previously.

> *"I have submitted a paper to a journal. When I checked there, I discovered that it had been accepted and was in the production process. After submitting another manuscript to another journal, I did not receive any comment for 6 months, so I was lazy to conduct any additional study because the decision of the journal was unpredictable." (P3)*

Students become doubtful and less motivated to conduct additional research. On the one hand, they aspire to be successful researchers who generate a significant amount of work and influence the field of science. However, despite contacting the journal via email and several other social media platforms, they felt depressed and less driven due to the lack of transparency of decision time. Aside from that, students frequently have trouble finding publications that fit into their financial plans because of the relatively high Article Processing Charge (APC) charged by journals.

> *"My article was accepted in a journal, but I withdrew it because I could not pay the APC." (P10)*

P9 also revealed that had problems paying APC which prevented the article from being published.

> *"I had to withdraw my article because I did not have money to pay the APC, and I submitted my article to a free journal even though I had to wait for a long time." (P9)*

Due to the APC, students must search for free publications to avoid paying high costs. Students have difficulty getting funding because their target journal is not yet internationally indexed. In the context of research, funded research is research that has an impact on both individuals and institutions. Nearly all the study's participants clarified that they were responsible for covering the publication expenses on their own, without any other financing. Even though students from different majors have diverse opinions, nearly all of them state the same opinion.

3.2. The students' solutions to overcome the challenges

Due Following the challenges of students in writing scientific articles, the researchers also pinpointed three major themes of solutions to overcome the challenges of students in writing scientific articles including self-strategies (creating a to do list and joining the training of scientific article writing), friends' assistance (asking for a proofreading and discussing with peers), and sources (increasing the literature sources and reading reputable sources). The solutions are summarized below.

Table 3. Themes and sub-themes of solutions applied by graduate students

Themes	Subtheme(s)
Self-strategies	Creating a to do list
	Joining the training of scientific article writing
Friends' assistance	Asking for a proofreading
	Discussing with peers
Sources	Increasing the literature sources
	Reading reputable sources

3.2.1 Self-strategies

Most of the participants experienced different challenges that hampered their writing of scientific articles. Those challenges require the participants to apply different strategies for everyone. Solutions or strategies that originate and are carried out by oneself are known as self-strategies. The demand for writing scientific articles makes students find solutions to face challenges and continue to conduct the research, so it can be reported in the form of scientific articles, for example, creating a to-do list which can help students to organize between all assignments and assignments for scientific writing articles.

> *"I have made a to do list to manage my time, but there are several tasks or job desks that are out of academics, such as campus accreditation, organization, and several other things that require much energy. Sometimes I move the timeline because there were some reschedules, but the solution is I also created a time period for short and long priorities, then urgent priorities." (P7)*

> *"After receiving a new assignment, I usually make another to-do list, so all the assignments can be done well." (P1)*

P7 and P1 stated that they made a to-do list, so they could know the assignments that needed to be done well. If P7 always makes short-term and long-term to-do lists, P7 always updates the list of assignments that must be done. These strategies are very helpful in reminding the students of regarding the urgent assignment, including the assignment to write a scientific article. These examples show how students are aware of the challenges in managing their time between all the tasks that they possess.

Concerning the challenges above related to the students' ability to write scientific articles using good academic language and writing, the students joined the training of scientific article writing which is often held by both institutions and communities outside the institution to increase knowledge about how to write articles by using academic writing. Participating in academic forums can improve a person's ability to write scientific articles as voiced by P3.

> *"I like to take advantage of wider access to resources and join writing training, so I can write articles well." (P3)*

This strategy is one of the solutions used by students to enable them to know how to write scientific articles well. The benefits of joining a training of scientific articles are not only to improve

writing and grammatical skills but can also increase motivation to conduct a scientific article writing. According to the participants, the participants tended to take part in writing training, so their skills increase, and they can write the scientific articles well.

3.2.2 Friends' Assistance

Almost all participants of this study explained that they could not solve all the challenges by themselves. Therefore, they need their friends' assistance. In this case, friends' assistance refers to help requested from other people to help alleviate the challenges encountered by the students. The different abilities of each person mean that each individual needs each other's help to overcome the challenges they face and cannot be overcome alone. Such assistance is known as friends' assistance, for example is asking for a proofreading as stated by P8.

> *"I asked my lecturer and my friend to check my English language structure." (P8)*

The lack of English skills possessed by each student is usually dealt with by proofreading for others, so the students who lack English skills can still write scientific articles. P8 admitted that their language deficiency is in the language structure. In other words, it is necessary to ask for help to other people to read the manuscript that has been written by the researchers. Additionally, there were also problems related to the lack of ability to find topics that could be written in scientific articles. This challenge made the participants discuss with their peers to gain insight into the topic.

> *"I find a solution by inviting my partners to discuss, and usually we do the assignment together. Usually, I do the assignment at the library." (P5)*

> *"I have to have a discussion every time I write a scientific article because I need to exchange opinions with my friends. I also discuss with my peers when I have a problem with the APC, the journal's decision that I did not get, or when I have a problem with the data collection permission" (P2)*

A discussion can provide new insights that can help solve problems. This strategy influences a person's thinking ability and provides new insights that can overcome challenges in the absence of topics, APC, data collection permission, and journal decisions. P5 and P2 show that one of the parties who can be invited to have discussions to find research topics is friends. This makes it easier for students to make agreements regarding discussions, both meeting schedules and discussion methods. However, the benefits of discussing with peers can be felt if the peers make you comfortable in the discussion and have more insight than the students.

3.2.3 Sources

The lack of references found by students forced them to increase the literature sources to find references that could support the statements given by students in the article. In the context of a research, an opinion must have references that can support the opinion. Some students have many sources to look for references, while others are still looking for sources, both national journals and international journals, that can provide references in their fields, as stated by P10 and P9.

> *"Sometimes I do not only look for sources in one journal, but I look for many journals that might contain articles with the discussion that I need." (P10)*

> *"Because the references that I look for in one data base were very little, so I looked for another data base." (P9)*

P10 and P9 tried to increase the literature sources due to the limited references that they found. As a response to the challenge that they encountered, they looked for as many articles as possible that contained the references they were looking for. This method is an attempt to find support for the findings of the researcher in the scientific article. The situation of limited references found teaches students to be creative in looking for references. Furthermore, students can also read reputable sources to find research gaps which can then be used as the basis for the research.

> *"I can find research gaps from reading several articles, and I find things that are not discussed enough, so I can improve them with my research." (P4)*

> *"I usually read a lot of articles, and from the reading activities, I know the differences between my research and previous research." (P6)*

By reading reputable sources, students can identify research gaps that can differentiate their scientific articles from other articles. According to the participants, they will read many articles to find things that were less researched by previous research. Such a phenomenon is called a research gap that must be present in every research. In other words, it is required to find research gaps in a study. To further clarify the findings of this research, the following discussion will clarify the explanation of the challenges encountered by the students and the solutions to overcome those challenges. The figure below shows the relationships between the challenges and solutions.

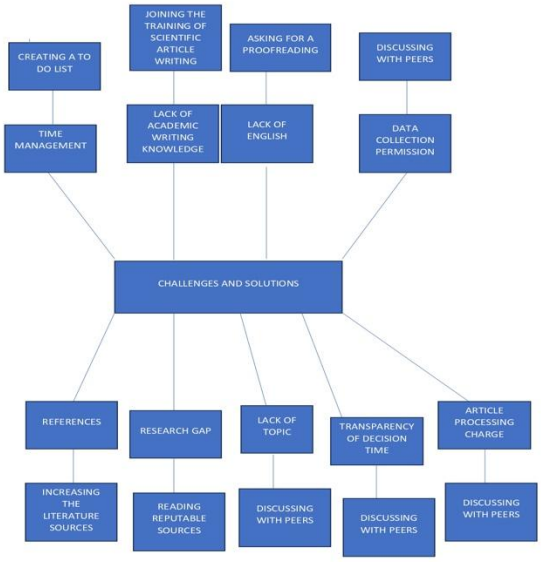

Figure 1. The relationship between challenges and solutions of graduate students in writing scientific articles

Discussion

This section scrutinizes the previous findings of this research through connection with relevant theories and recent literature. First, this study has shown that students encountered several challenges in writing scientific articles, such as linguistic knowledge. In writing scientific articles, students experience problems in the linguistic knowledge which makes it difficult for them to write scientific articles. One of the subthemes of linguistic knowledge that is most often experienced by students is the research gap. Difficulty in finding research gaps makes students unmotivated to continue their research. The findings are in line with some previous studies (Olbert, 2024).) which revealed that one of the biggest challenges in writing scientific articles is the difficulty of finding gaps between previous research and current research. This is caused by a lack of reading material that is relevant to the

research, which can cause the students to be unable to identify the differences between the research topics currently being carried out and previous research.

Regarding the external relationship, the student is very interfered by the difficulty of data collection permission from the institution being researched. Obtaining research permission is one of the ethical aspects of research. The difficulty of obtaining permission makes the process of writing scientific articles very difficult. From the data collected, it could be implied that one of the reasons behind the difficulty of data collection permission is due to the time adjustment between the time possessed by the school and the time possessed by the researchers. Parallel with a study conducted by Mollen (2024) that stated permission from the data collections' party can have an influence on the process of writing scientific articles. The research indicated that each data source taken by researchers had its challenges. In this special case, the participants stated that because data collection permissions were difficult, they became stuck in conducting research.

The challenges faced by students are also due to the difficulty of finding references that are relevant to the research they are conducting, which is one of the challenges often encountered by students in the themes of time management and reference issues. The limited references relevant to the students' research topics make it difficult to find references. In line with the previously explained challenge, Somnuke et al., (2023) also found that one of the obstacles in writing scientific articles is the difficulty of finding relevant references from reputable journals. The small number of references found by the researchers means the quality of their research is not accurate, and the information conveyed to readers is also limited. The students also had trouble in knowing the transparency of decision time from the journal. This subtheme is the challenge most often encountered by students which is part of the theme of journal issues. Lack of transparency of decision time from journals is a challenge because students must wait for decisions on the articles they submit. Based on the interviews, a lack of transparency in decision-making can cause students to lack motivation and interest in conducting further research.

Apart from finding the challenges faced by students, the researchers also found solutions that were used by students to overcome the challenges. The students use self-strategies, which is one way to organize themselves when facing challenges. In other words, self-strategies are carried out by individuals without involving other people. The self-strategy most often used by students is creating a to-do list. The interviewed participants admitted that they tended to create a to-do list to find out and remember the tasks that needed to be finished. This is in line with research results of Grimm et al., (2024) which say that creating a to-do list can make someone more productive and effective in carrying out tasks.

Students also use friends' assistance, one of the subthemes most frequently used by participants is asking for proofreading. Students ask friends or people they believe to provide feedback on the English they use in writing the scientific articles. They admit that by being read by other people, their writing of scientific articles improves, and errors contained in previous writings can be found and corrected. Sippel and Martin (2024) found that although there is a lot of technology that can provide feedback on writing, feedback from humans is still needed.

The final strategy applied by students to overcome the challenges is to increase sources, the subtheme most often used by students is reading reputable sources. Eight of ten participants admitted that reading reputable articles or sources helped them overcome limited references, lack of topic, and lack of ability to find a research gap. Some of them read reputable sources from one database, and some of them use many reputable databases. In line with the findings, Dahlen et al. (2024) found that reading many reputable sources can increase students' knowledge. Furthermore, Payant et al., (2019) found that reading reputable sources can provide more accurate references to the students' scientific articles.

Institutions can play a critical role in addressing these challenges. They could organize workshops or training sessions on identifying research gaps and using academic databases effectively. Providing access to a broader range of reputable journals and resources can significantly reduce the difficulty of finding relevant references. Institutions should also streamline the process for granting research

permissions by establishing clear guidelines and minimizing bureaucratic delays. Furthermore, fostering a culture of peer review and collaboration through writing groups or mentorship programs can help students refine their work and build confidence in their research capabilities. By addressing these systemic issues, institutions can empower students to overcome barriers and excel in their academic writing.

The findings of this study also have implications for graduate students in various contexts and fields. Graduate students, regardless of their disciplines, often encounter similar challenges, such as identifying research gaps, managing time effectively, and accessing high-quality references. By applying the strategies outlined in this study, such as leveraging peer feedback, utilizing reputable sources, and adopting self-management techniques, graduate students can navigate these obstacles more effectively. Moreover, institutions catering to graduate education can draw on these findings to design targeted support systems, such as cross-disciplinary workshops and resource-sharing platforms, to ensure that students from diverse fields benefit from improved academic writing support.

This study has outlined challenges and solutions in writing scientific articles, especially for graduate students, which meets graduate teachers' needs and goals for improving their writing skills. Despite the limitation in the instruments due to limited participants, this study reveals that graduate students improved their writing skills in scientific articles despite experiencing several challenges. Hence, future research can expand the number of participants and use instruments that can reach many participants to obtain opinions from a wider perspective.

4. CONCLUSION

This study found that graduate students face multiple challenges in writing scientific articles, including difficulties in topic selection, time management, and limited academic writing skills. Despite these obstacles, students adopted various strategies—such as peer collaboration, using academic resources, and participating in writing workshops—to improve the clarity, structure, and academic rigor of their work. These proactive efforts helped students not only overcome writing difficulties but also develop stronger scholarly writing competencies. However, the study's primary limitation lies in its small sample size and focus on a single qualitative method, which may limit the generalizability of the findings. Future research should include larger and more diverse participant groups, possibly incorporating mixed-method approaches to gain a deeper and more comprehensive understanding of the challenges and effective interventions in scientific writing. Additionally, longitudinal studies could assess the long-term impact of institutional writing support on students' academic development. Expanding this line of inquiry will help inform evidence-based practices for enhancing graduate-level academic writing.

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