Writing about Research in Respiratory Therapy: Comparing Published Research Articles and Master's Theses and Exploring the Academic Writing Challenges of Graduate Students

Writing about Research in Respiratory Therapy: Comparing Published Research Articles and Master's Theses and Exploring the Academic Writing Challenges of Graduate Students

by

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ABSTRACT

Disciplinary variation has been a growing interest in English for academic purposes research (Basturkmen, 2012; Hardy & Roemer, 2013). However, there is little research on writing conventions in the respiratory therapy discipline, which connects English as an additional language (EAL) users worldwide. To explore academic literacy in respiratory therapy, corpora of respiratory therapy research articles and master's theses were collected. Using multi-dimensional analysis, the lexico-grammatical features in each corpus were compared to explore differences in student and expert writing. The rhetorical moves of a subset of research articles were analyzed. To identify academic literacy challenges in respiratory therapy and approaches to overcoming these challenges, a survey was distributed to respiratory therapy master's students, and instructors and EAL master's students were interviewed. The MDA results indicated significant differences in the features used in student and expert writing: student theses contained wordier descriptions than research articles, RAs contained more descriptive connecting devices than theses, students used different features from expert writers to convey action-focused styles, and RAs displayed cautious author-involvement. The rhetorical moves identified included general openers, referencing specific findings, indicating the need for the study, announcing the study (introduction), describing the study and data, explaining procedures, describing the analysis (methods), providing general information about the sample, reporting results of measurements, providing analysis results (results), introducing the discussion section, elaborating on the results, listing limitations (discussion), discussing the general topic, stating results, providing interpretations, and stating implications (conclusion). Survey and interview data indicated that students faced challenges with source-based writing (reading comprehension, paraphrasing, citation, literature reviews), vocabulary, grammar, concision, organization, clarity, survey

question composing, topic selection, and attitudes towards writing. Students developed strategies for practicing reading and writing, focusing on key ideas in texts, taking reading notes, finding themes in the literature, following the structure of example texts, revising drafts, and starting writing projects early. Students utilized departmental resources (a writing seminar, scaffolding assignments in courses, and support from instructors), university librarian support, and electronic resources (academic source databases, AI paraphrasing tools, translation tools, Grammarly, and citation software) to overcome these challenges. The results have implications for EAP pedagogy and future research.

INDEX WORDS: Discipline-specific writing, English for specific and academic purposes, Corpus linguistics, Second language academic literacy, English for respiratory therapists

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DEDICATION

This dissertation is dedicated to all the participants who made the project possible. I appreciate their valuable contributions.

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1 BACKGROUND

Because Academic English has long been recognized as having unique vocabulary and structures (Halliday & Martin, 1993), English for Academic Purposes (EAP) researchers have sought to explore academic writing norms in different disciplines to draw pedagogical implications. Many studies have provided general descriptions of academic writing (e.g., Zhang, 2016), often drawing practical implications for EAP teachers in areas like vocabulary (Hsu, 2013; Hyland & Tse, 2007), complexity (Biber & Gray, 2010), and phraseology (Biber, 2006). One genre of academic writing that has received considerable attention in EAP discussions is the research article. Many studies describing research articles have been conducted, and they have provided detailed information about structure and rhetorical organization (Bazerman, 1983; Swales, 1990, 2011), as well as the functions of lexico-grammatical features (Friginal & Mustafa, 2017). However, Swales (2004) describes the research article genre as slowly evolving, and since research articles are written for discipline-specific readers, the research article writing conventions evolve separately in each discourse community. Hyland (2000) describes disciplinary discourse communities as cultures, and each disciplinary culture develops its own communication norms for sharing research in writing. Many studies have identified disciplinary variation in how research articles are written (e.g., Gray, 2015; Hyland, 2008; Martínez, 2001), but there are some disciplines, such as respiratory therapy, that have not yet caught the attention of EAP researchers.

Respiratory therapy is a growing healthcare specialization, and many international students enroll in respiratory therapy programs at universities in the United States (U.S.) (AbuNurah et al., 2020). Outside of the US, English is used in many respiratory therapy programs, even in places where English is not the official language. Furthermore, respiratory

therapy scholars from many different language backgrounds share research with international audiences in English-medium journals. For these reasons, many respiratory therapy students seek to learn English, and especially English academic reading and writing. Respiratory therapy education researchers have argued that teaching students about conducting research is an important component of respiratory therapy training programs (Goodfellow, 2024), and they have shown interest in discipline-specific writing (Hess, 2023; Willis, 2023) and reading (Durbin, 2009). Nonetheless, EAP researchers have not focused their efforts on analyzing the literacy needs of this learner population.

To find ways that students can write more like professional academic writers in their fields, many researchers have compared published research papers and student writing. Studies aiming to draw implications for undergraduate EAP students have compared research articles and student essays (Hardy, 2014), and studies aiming to draw implications for graduate EAP students have compared research papers with theses (Pan, 2018; Ren & Li, 2011; Samraj, 2013). This approach has led to information about teaching writing to students in many disciplines, such as applied linguistics (Ansarifar et al., 2018), engineering (Koutsantoni, 2006), and biology (Samraj, 2013), and it has potential for informing writing pedagogy for respiratory therapy students.

In addition to analyzing writing styles and written communication norms by examining texts, ethnographic approaches can be used to provide insight on the second language writing process. Finding common challenges in the academic writing process can also be helpful for drawing pedagogical implications (Evans & Green, 2007). Research that offers solutions to the potential difficulties of second language (L2) academic writing is also insightful. As researchers try to move away from “damage research” (Tuck, 2009), examining the writing practices of

successful L2 EAP writers has also led to useful insight on strategies that EAP teachers could consider teaching learners to use (Petrić & Harwood, 2013). Since reading is a key part of the academic writing process, the reading-writing connection is often a focal point in studies addressing the academic writing process (Grabe & Zhang, 2013, 2016). There has not, however, been any research on the challenges that respiratory therapy students face, the strategies that successful respiratory therapy students use when writing, or the reading-writing connections in the respiratory therapy discipline.

In sum, previous EAP literature has indicated that there are unique writing conventions that pose unique challenges in each discipline. Although this issue has led EAP researchers to examine writing in many specific fields, academic literacy within respiratory therapy remains understudied, in spite of the large number of language learners writing in this field. EAP instructors who have students in respiratory therapy do not have access to enough discipline-specific writing research to inform their teaching approaches. To address the need for EAP research informing writing pedagogy for respiratory therapy students using English as a second or additional language, this dissertation examines the characteristics of writing in this field, as well as the writing processes of respiratory therapy students. The dissertation begins with an overview of the previous research on writing styles found in research articles and the disciplinary variation that has been described that makes it reasonable to hypothesize that unique discourse patterns can be found in other disciplines whose written communication norms have not yet been analyzed, as well as the approaches that have been used to explore the EAP writing process and its connection to reading. It then argues for the importance of continuing to research disciplinary variation, with particular attention to the potentially useful pedagogical implications that could come from research on the writing norms within respiratory therapy discourse communities. In

the Methods chapter, the corpora, rhetorical organization analysis, factor analysis of lexico-grammatical features, participants, surveys, interviews, and observations are described. The results and discussion are split into four chapters, two chapters describing research articles and theses, one chapter addressing the academic writing challenges identified, and one chapter discussing strategies for addressing these challenges, with connections to previous literature in each chapter. Following the results, pedagogical implications, limitations, and future directions are discussed.

1.1 Respiratory Therapy

Respiratory therapists specialize in treating problems related to breathing. They are trained in operating ventilators, CPAP machines, nasal cannula devices, bronchoscopes, and other breathing-related technology and implementing procedures for treating breathing issues. In hospital settings, they help patients with issues such as infections that lead to breathing problems, chronic illnesses that affect breathing (such as COPD and asthma), emphysema, and smoking-induced breathing problems, and they often work in intensive care units with patients having severe breathing issues. In recent years, many respiratory therapists have been working with patients who have breathing difficulties due to COVID-19. In settings where respiratory therapists are not available, other healthcare professionals may perform the same tasks, but the specialized expertise of respiratory therapists is preferred for respiratory problems, especially in cases requiring skillful operation of machinery. In hospitals where research is expected, respiratory therapists also participate in conducting and writing up research on topics relating to respiratory illnesses, the use of technological tools, and training respiratory therapists who are new to the field. Students hoping to become respiratory therapists can obtain associate degrees or bachelor's degrees and pass the Therapist Multiple-Choice Examination (TMC) to become a

Certified Respiratory Therapist (CRT), and if they receive a high enough score, they are eligible to take the Clinical Simulation Examination (CSE) to become a Registered Respiratory Therapist (RRT) (American Association for Respiratory Care, 2022). Although graduate studies are not needed to work as a respiratory therapist, many students choose to continue their education and pursue master's degrees for reasons such as desire to advance their qualifications, receive a higher salary, pursue their interests, or conduct research (Showalter et al., 2021). Respiratory therapy is expected to be a growing occupation in the coming years (Bureau of Labor Statistics, 2022), and international students enrolled in respiratory therapy programs in the United States have been reported to see their experience in a U.S. program as a way to professionally develop and increase their "global understanding" (AbuNurah et al., 2020).

1.2 Literature Review

An overview of studies describing academic literacy, and particularly research article and thesis writing and the integration of reading skills in academic writing, is provided below. The literature that relates to this study is reviewed in three sections. The first section on literature analyzing writing from a *product* perspective reviews studies that analyze texts (research articles or research article-thesis comparisons) using quantitative and qualitative corpus approaches. The work on analyzing the rhetorical structure of different sections of research articles is outlined, including work on the organizational patterns found in medical research articles in general, which could be expected to be similar to respiratory care research articles. Biber's (1988) approaches to register description using factor analysis with qualitative interpretations is discussed with examples of how it has been used in studies describing discipline-specific academic writing. Studies comparing writing from graduate students and published authors are discussed.

The second section on analyzing writing as a *process* reviews ethnographic approaches to analyzing the EAP writing process, including studies specifically examining the use of technological writing support tools and the role of reading in academic writing. The third section briefly describes the arguments that have been made for combining corpus and ethnographic approaches in mixed-method studies to juxtapose product and process information, reflecting the complex multi-layered nature of academic writing in an additional language.

Analyzing Writing as a Product

The academic cultural norms of reporting research in writing have evolved slowly over time. Swales (1990) identified The Philosophical Transactions of the Royal Society as the first scientific periodical, with its first issue published in 1665. According to Swales, the idea of sharing research among scientists was influenced by Boyle's beliefs in sharing experiments to establish common knowledge, as well as the importance of witnesses, replication, and replicability in science (Shapin, 1984, as cited in Swales, 1990). Journal articles started as letters between scientists written in narrative first person accounts, but the structure changed over time. By the end of the 18th century, research articles contained an introduction explaining problematic phenomenon, description of experiments (usually one experiment led to a need for more), and conclusion summarizing the explanation of the phenomenon found in the experiments (Bazerman, 1983, p. 16-17, as cited in Swales, 1990). By the 20th century, the need to include a literature review in research articles emerged, and the personal narrative style had disappeared. Atkinson (1992) traced the historical development specifically of medical research articles from 1735 to 1985, and many of his descriptions align with Swales's (1990) discussion of changes over time in scientific research articles in general. He reported that medical research articles were often originally written as letters directly addressing the editor with a strong authorial

presence. From 1775-1864, they were written as detailed narrations of a single case, starting with general patient information, followed by a discussion of the history of the patient's symptoms before the author observed them, the author's examination, the first treatment and its effects, subsequent treatments and their effects, the course of the disease, and the patient's outcome. Over time, there was a tendency to report collections of multiple related cases side-by-side in separate narratives, and by the 1900s, medical research articles started to move towards favoring large numbers of cases to form generalizations over detailed case reports of individual patients, eventually fitting into the introduction, methods, results, discussion (IMRD) format.

The evolution of journal articles over time, reflecting the goals of the writers and the ideologies of the target readership, can be expected to unfold differently across disciplinary discourse communities. In some ways, research articles in each discipline are written in a very similar style, but there are also differences that have developed. Many different approaches have been taken to studying different characteristics of research articles at varying levels of detail. There is noticeable similarity in the rhetorical organization of research articles across disciplines, but some variation has also been identified.

1.2.1.1 Rhetorical Structure of Research Articles

Much research on writing styles in research articles has focused on the rhetorical structures that are common across disciplines. Research articles tend to include an introduction with a description of the problem addressed in the research, a literature review, description of experimental methods and results, and a conclusion that summarizes the findings (Bazerman, 1983). Zooming in on the introduction section, Swales (1990) is famous for his work describing common "moves" and "steps" that are generally shared across disciplines, which are displayed in

Table 1. Although Swales focused on commonalities across discipline, he noted that some moves and steps were more commonly found in some disciplines than others.

Table 1 Swales's (1990) Move-Step Scheme for Introductions

Move 1	**Establishing a territory**
Step 1	Claiming centrality and/or
Step 2	Making topic generalizations and/or
Step 3	Reviewing previous research
Move 2	**Establishing a niche**
Step 1A	Counterclaiming or
Step 1B	Indicating a gap or
Step 1C	Question-raising
Move 3	**Occupying the niche**
Step 1A	Outlining purposes or
Step 1B	Announcing present research
Step 2	Announcing principal findings
Step 3	Indicating research article structure

1.2.1.1.1 DISCIPLINARY VARIATION IN RHETORICAL ORGANIZATION: INTRODUCTION SECTIONS

Although similarities in introductions across disciplines have been established by Swales, some disciplinary variation in research article introductions has also been observed, particularly within the steps of each move and the frequency at which each move and step appear. Bazerman (1981) found differences in how researchers in hard and soft sciences situate their work, noting

that readership in hard sciences may be assumed to have more shared background knowledge. Differences within the hard sciences have also been explored. In a comparison of introductions in wildlife behavior and conservation sciences research articles, Samraj (2002) found that wildlife behavior introductions generally follow Swales's model, with an added step giving background information about the species being discussed, but claims of centrality may be rare. In contrast, the claim of centrality is very clear in conservation biology introductions, often with references to environmental crises, suggesting that the topics discussed in each discipline might have a role in which rhetorical steps authors would be inclined to take. Samraj also noted that the gaps that are highlighted in conservation biology are often gaps in real world conservation issues rather than gaps in research. Other variation in Swales's second move has also been identified. In management research articles, for example, the step of highlighting a gap and the newness of the research has been demonstrated to be very prominent, whereas justifying a study by discussing how it will add to the existing research is less common (Lim, 2012). Towards the end of introduction sections, Swales and Najjar (1987) found that including information about results was much more common in physics than in educational psychology, and Dahl (2008) noted subtle differences between linguistics and economics research articles in the claims about the new knowledge that the study brings. Even within the same discipline, there is some evidence that sub-disciplines demonstrate variation. Within the field of linguistics, second language acquisition research articles have been reported to follow the CARS structure (Ozturk, 2007), English for Specific Purposes research articles (specifically written in English) have been reported to follow Swales's moves closely but sometimes cycle back to previous moves (Hirano, 2009), and second language writing research articles have been reported to use more varied organization patterns (Ozturk, 2007). Ozturk observed that some second language writing

research articles repeat move 1 (topic generalizations) between moves 2 and 3, others skip move 2 (establishing the niche), and the rest have varied structures. The differences noted among sub areas within applied linguistics could support Samraj's (2002) observations about the role of topic in rhetorical patterns, which may be a factor in the development of disciplinary variation, in addition to the role of discourse community writing norms.

1.2.1.1.2 DISCIPLINARY VARIATION IN RHETORICAL ORGANIZATION: METHODS SECTIONS

Though much attention has been paid to research article introductions, later research has also addressed commonalities and differences across discipline that can be found in other sections of research articles. Swales (1990) hypothesized that the most disciplinary variation would be found in methods and results sections. A very notable example of disciplinary variation is the lack of a methods section that has been observed in history research articles (Holmes, 1997). Within the disciplines that include methods sections in their research articles, one type of variation that has been identified is the level of detail and concision. Using Swales and Feak's (2004) classification of methods types, Bruce (2008) used a multidisciplinary research article corpus to examine the elaboration words and structures in "fast," or compressed, methods sections (common in physical sciences) and "slow," or extended methods sections (common in social sciences). Fast methods sections presented the procedures sequentially, whereas slow methods used chronological and non-chronological events side by side. In slow methods sections, a preview summarizing the procedures introduced the section before subsections with more details. The fast methods sections relied more on lexical items to convey the relationships between ideas (compression), whereas the slow methods sections used elaboration structures such as relative clauses to explain the connections (extension). Other studies have focused on the

methods sections of a single discipline. For example, specifically in management research articles, Lim (2006) identified three rhetorical moves in the methods sections, which were "describing data collection procedures," "delineating procedures for measuring variables," and "elucidating data analysis procedures" and sub steps within each move such as justifying the measurement methods (found in all the articles analyzed), but since the focus was only on management research articles, it is not clear whether these moves are unique only to that discipline.

1.2.1.1.3 DISCIPLINARY VARIATION IN RHETORICAL ORGANIZATION: RESULTS SECTIONS

In regard to results sections, the labels for moves that researchers focusing on different disciplines have provided are similar, but some disciplinary variation in reporting results has been identified. Lim (2010) describes that applied linguistics and education research article results sections that he analyzed shared three steps, which were "giving reasons for the findings," "expressing views on the findings," and "comparing findings with the literature," but applied linguistics research articles had a fourth step, "making recommendations for future research," that education research articles did not have. Applied linguistics results sections also had more comments and comparisons to previous research than education results sections. Brett (1994) found that sociology results sections had a unique feature the had not been previously described in other disciplines: there were often new questions raised because of the observed results and descriptions of methods of how these questions were investigated, like a secondary methods and results piece within the results section.

1.2.1.1.4 DISCIPLINARY VARIATION IN RHETORICAL ORGANIZATION: DISCUSSION SECTIONS

Discussion sections may be more difficult than other sections to compare across disciplines, as they are sometimes combined with results, sometimes act as a conclusion by themselves or are joined in a "Discussion and Conclusion" section, and other times a separate section in between the results and conclusion sections (Lin & Evans, 2012). However, in spite of this challenge in drawing comparisons, some disciplinary variation has been documented. Hopkins and Dudley-Evans (1988) describe discussion sections in science research articles as being divided into "Background Information," "Statement of Result, "(Un)Expected Outcome," "Reference to Previous Research (Comparison)," "Explanation of Unsatisfactory Result," "Exemplification," "Deduction," "Hypothesis," "Reference to Previous Research (Support)," "Recommendation," and "Justification," but Holmes (1997) found that all of these moves were optional in social sciences. Holmes (1997) also identified differences in complexity, cycling back to previous moves, including optional moves, and choices for closing move in discussion sections of history, political science, and sociology research articles. Additionally, in sociology research articles, more than half of the discussion sections Holmes analyzed consisted of stating results and recommendations, whereas the history and political science research articles devoted less text to this function. Moves in applied linguistics research article discussion sections that have been identified are slightly different, comprising of background information, summarizing the results, reporting a result, and commenting on the result (through the steps "explanation of result," "comparing the result with a result in the literature," and "evaluating a result,") (Basturkmen, 2009). Subtlety different moves in dentistry RAs have been described as "background information," "summarizing results" (optional and less common), "report a result

or linked results," "commenting on that/those results," "evaluating the study" (optional and less common), and "implications for further research and/or clinical practice or policy" (Basturkmen, 2012).

1.2.1.1.5 POTENTIAL FOR MOVE ANALYSIS IN STUDIES ON RESEARCH ARTICLES IN OTHER DISCIPLINES

The research focusing on each section of the article has revealed some variation across disciplines, often using Swales's move-step approaches. However, since each researcher conducting a new move analysis chooses different labels for moves and steps, sometimes describing similar phenomena with different terms and levels of specificity, it can be difficult to draw comparisons between studies. In addition, since move analysis can be time consuming, the samples analyzed to establish the patterns are often smaller than Swales's (1990) sample, so replication of move analysis studies is encouraged (Basturkmen, 2014). Overall, since disciplinary variation has been identified through move-step analysis, it has potential to be a useful approach for an exploratory analysis of the rhetoric of other disciplines, such as respiratory therapy, to offer organizational frameworks for students.

1.2.1.1.6 MOVES OF MEDICAL RESEARCH ARTICLES

The rhetorical organization patterns that have been found in medical research articles in general may be a helpful starting point for studies on the structure of respiratory therapy research articles. There has been some work on identifying rhetorical organization of research articles in medical discourse communities, but small corpora were used because of the time-consuming manual work that move analysis requires. In a sample of 30 texts, Nwogu (1997) identified eleven rhetorical moves in medical research articles. In the introduction sections, common moves were (1) providing background information (optional), (2) reviewing previous research, and (3)

presenting the new research. The methods section had moves for (4) describing the data collection process, (5) procedures and materials, and (6) data analysis (optional). Moves in the results sections included (7) noting observations and (8) indicating "non-consistent" observations (optional), and the discussion sections consisted of (9) focusing on the overall outcomes of the research, (10) explaining the research outcomes, and (11) stating the conclusions. The corpus size was very small, but Nwogu was able to carry out a detailed analysis with a small set of texts. Li and Ge (2009) compared the appearance of Nwogu's (1997) moves in a corpus of 50 medical research articles from two different time periods (1985-1989 and 2000-2004). Moves 1 and 6 that had previously been identified as optional seemed to become obligatory by 2000-2004, whereas move 9 that was previously identified as obligatory seemed to become optional by 2000-2004. They also found some changes in the linguistic features used within each move. The study provided interesting information about how medical research articles may have changed over time. The corpus size of this study was also small, but it is worth noting that they were generally able to identify Nwogu's (1997) moves, which could be seen as some validation of his findings. Examining the presence or absence of his moves in additional corpora, especially in research articles from specific medical specializations, could further contribute to what is known about the structure of research articles in health sciences.

1.2.1.1.7 WHAT ORGANIZATIONAL FRAMEWORKS FOR RESEARCH ARTICLES DO RESPIRATORY THERAPY SCHOLARS RECOMMEND?

Although there have not been descriptive studies on how respiratory therapy papers are organized, some respiratory therapists have published prescriptive opinions on how research papers should be organized so that novice writers have a structure to follow. Branson (2004) provided an overview of what he believes writers should include in each section of a respiratory

therapy research paper, and other scholars (Hess, 2023; Kallet, 2004; Willis, 2023) have focused on their opinions for specific subsections. Their advice for what to include in each section can be pieced together to form a framework similar to Nwogu's (1997) move scheme, with some variation, but it is not supported by empirical evidence.

Branson (2004) recommends 2-3 paragraph introductions. In the first paragraph, he believes that there should be background information without many references. In the second paragraph, he recommends more information about the problems that have not been solved. In the third paragraph, he suggests justification for the study, research questions, and a hypothesis (which he states novice writers often forget to include). The hypothesis can be a broad statement about the researcher's expectations, but the research questions should be specific (Durbin, 2004). Durbin provided an example research question, "Do patients who initially have similar oxygen needs spend fewer days on a higher oxygen flow if receiving care from a respiratory therapist or from a nurse?" illustrating the expected specificity (2004, p. 1197).

The quality of the methods section is emphasized as a very important component of successful research-article writing. There is general agreement that the methods section should include enough detail for readers to be able to repeat the study (Branson, 2004; Kallet, 2004; Willis, 2023) and evaluate its validity (Kallet, 2004; Willis, 2023). The methods section can start with a description of the design of the study (Willis, 2023), and it is recommended to include a description of the participants, equipment or materials, interventions, procedures, or protocol, and analysis (Branson, 2004; Kallet, 2004). When describing the study design, Willis (2023) recommends following standardized guidelines, like the International Committee of Medical Journal Editors (ICMJE, 2025) requirements. After the study design description, information about the setting that is important for understanding the generalizability of the results should be

included (Willis, 2023). Studies with human or animal subjects should include information about ethics committee approval or other ethical considerations in the participants section (Branson, 2004; Kallet, 2004; Willis, 2023), or alternatively, near the beginning of the methods section (Willis, 2023). Kallet (2004) and Willis (2023) recommend including any details about human participants that may be relevant to the intervention tested such as information about their demographics, their health status, the diversity of the participant pool (so that readers know how generalizable the results are), and the study's inclusion criteria, but not the number of participants (Willis, 2023). For studies with animal subjects, Kallet (2004) suggests including information about whether and how the animals were sedated, and if applicable, how animal tissue was prepared. The equipment or materials description should include the company. Branson (2004) noted that for some journals, the company information is listed at the end of the paper instead of the methods section, and Willis (2023) believes that the first mention of the equipment should include the company name, but subsequent mentions should use the generic name. Information about how equipment was calibrated and validated (Branson, 2004; Willis, 2023), how materials were prepared (Kallet, 2004; Willis, 2023), and the settings used for each piece of equipment (Willis, 2023) should also be included, in order of most important to least important tools (Kallet, 2004). Willis (2023) recommends including photographs of the equipment with text labels. If drugs were used, Kallet (2004) believes that both the generic name and company name of the drugs should be included, but Willis (2023) recommends avoiding company names unless it is relevant to testing the drug to avoid promoting one company more than others. The concentration (Kallet, 2004; Willis, 2023), dosage (Kallet, 2004; Willis, 2023), frequency (Willis, 2023), administration route (Willis, 2023), infusion rate (Kallet, 2004), and for inhaled drugs, flow rates (Kallet, 2004; Willis, 2023) should be specified. The procedures

should be described chronologically (Branson, 2004; Kallet, 2004; Willis, 2023), and reader-friendly figures or timelines illustrating the procedures can support the text (Branson, 2004; Willis, 2023). Kallet recommends clear descriptions of measurements prior to interventions. If any novel procedures were used, Kallet (2004) believes that a citation for their validation in another paper should be included, and depending on the target readership, justifications for methodological choices may also need to be included. There should also be a description of how measurements and calculations were done (Kallet, 2004; Willis, 2023), with explanations of why each variable was measured and what the measurements indicate (i.e., cutoff values for relevant health conditions) if needed (Kallet, 2004). The analysis subsection should "describe how the data will be presented in the results section (e.g., mean vs median)" (Kallet, 2004, p. 1231) and include the statistical tests used and cutoff *p* values indicating significant results (Branson, 2004; Kallet, 2004; Willis, 2023), as well as power analysis results to justify the sample size (Willis, 2023). Justifications and citations for the tests chosen can also be included (Branson, 2004). Any software used for the statistical analysis should be cited (Willis, 2023). Kallet (2004) also makes grammatical recommendations for the methods section. He believes that past tense should be used to recount procedures, and interestingly, he cautions against using compound sentence structures.

In the results section, Branson (2004) recommends evidence for or against the hypothesis, answers to the research questions, and information about the results of the statistical procedures mentioned in the methods, especially any significant results. The results of each piece of the experiment should be listed in the same order that they were described in the methods section. Contrary to the advice given in other fields, he believes that information included in tables should not also be included in prose. He specifies that past tense should be used, because present

tense could imply that the findings are generalizable outside the experiment, whereas past tense only implies reporting on what occurred in the experiment.

In the discussion section, the major findings of the study can be stated concisely in the opening (Hess, 2023). The next piece of the discussion involves explaining what answers to the research question mean, without drawing implications outside of the specific items tested in the experiment (Branson, 2004; Hess, 2023). Explanations of why the findings matter should also be included (Hess, 2023). After this step, the findings can be related to previous studies (Hess, 2023), and other studies should also be cited when interpreting the results (Branson, 2004). The discussion can also include possible alternative explanations (reasons besides the study's intervention) for the results that were observed (Hess, 2023). The practical relevance of the findings for healthcare settings should also be explained (Hess, 2023). When there is a conclusion in addition to a discussion, Branson (2004) recommends briefly summarizing the findings of the study, including personal inferences, and recommending future directions. Hess (2023) believes that the conclusion should be very short. In the absence of a separate conclusion section, Hess (2023) recommends writing limitations and suggestions for future research in the discussion, and concluding with a "take home message" about the findings.

These prescriptions are not based on any evidence or analysis of texts, and the percentage of research articles adhering to this advice has not been determined, but the suggestions of prominent writers in the field are nonetheless informative for forming hypotheses about the organizational frameworks that can be expected to be found in research articles. After systematically checking whether these recommended pieces of information are commonly found in published research articles, more details about how each piece is written can be found using move-step analysis techniques. The interest among respiratory therapy education researchers in

sharing opinions about how research articles should be organized indicate that interdisciplinary collaboration to explore this topic further would be worthwhile.

1.2.1.2 Disciplinary Variation in Grammar

The research on the frequencies of grammatical features in research articles has also pointed to disciplinary variation. Researchers have examined the distributions of a wide array of grammatical features relating to style, such as unattended demonstratives (Gray, 2010; Swales, 2005), directives, (Hyland, 2002), and imperatives (Swales et al., 1998), as well as features used to perform communicative functions such as reformulation for clarification and exemplification (Hyland, 2007), assertion (Hyland, 1998; Peacock, 2006), and persuasion (Hyland, 2005). Since many different grammatical features have been found to display variation across discipline in research articles, an exploratory study on disciplinary variation of grammatical features should include a wide selection of features. Additionally, since grammatical features are used in meaningful contexts, the relationships between grammatical features and their semantic functions should be considered. When analyzing the linguistic features in an understudied register, rather than focusing on one grammatical feature at a time, it would be preferable to consider the interactions of many features.

1.2.1.2.1 MULTI-DIMENSIONAL ANALYSIS STUDIES ON REGISTER VARIATION

One way to address the interactions of multiple grammatical features is using Biber's (1988) multi-dimensional analysis (MDA) approach, which is a way of exploring the co-occurrence of linguistic features through factor analysis, followed by a qualitative analysis of the communicative functions that co-occurring features perform in the texts. Conducting an MDA consists of tagging linguistic features, normalizing the frequency counts of the linguistic features, conducting a factor analysis to determine which linguistic features tend to occur together,

examining the complementary distribution of features that often occur together and features that rarely occur together in each factor, summing the *z*-scores of the frequencies of linguistic features that have strong loadings with each factor to give each text a "dimension score" for each factor, calculating the average dimension score of all the texts in the corpus for each factor, and manually analyzing the functions of the features with strong loadings on each factor. Biber argues that the statistically strong co-occurrence of linguistic features has underlying functional purposes. To search for these communicative purposes, the use of the features with strong loadings in each factor can be examined in the texts that have high dimension scores and corpus-based grammar books can be consulted (Friginal & Hardy, 2019). After examining the features that have strong loadings with each factor in the contexts they are used in, the factors are named to reflect the communicative function of the features. Biber (1988) used this approach to explore the linguistic features used in different registers of spoken and written English (i.e., conversation, broadcasts, prepared speeches, personal letters, general fiction, press reportage, academic prose, and official documents), and subsequent studies have compared the distribution of the same linguistic features in other registers, such as research articles, to Biber's (1988) findings. Conrad (1996b), for example, provided a description of ecology research articles by calculating the texts' scores on Biber's (1988) dimensions and found that the research articles were characterized by a non-narrative, informational, impersonal style in comparison to other registers. Other studies conduct a new factor analysis (i.e., not using Biber's [1988] established factors) as an exploratory approach to describing register variation and use Biber's steps for interpreting the results. Biber and Jones (2005), for example, conducted an MDA of biology research articles to provide register descriptions that are unique to that discipline.

MDA has been used both in studies focusing on a single discipline (e.g., Biber & Jones, 2005; Conrad, 1996b) and in studies exploring disciplinary variation by comparing corpora of research articles from multiple disciplines. Gray (2013) provided notable evidence of disciplinary variation in research articles using MDA to compare applied linguistics, history, physics, philosophy, biology, and political science research articles, categorized as theoretical, qualitative, and quantitative sub registers. Her analysis resulted in four factors, which she named "Academic Involvement and Elaboration vs. Information Density," "Contextualized Narration vs. Procedural Discourse," "Human vs. Non-Human Focus," and "Academese." In the Academic Involvement and Elaboration vs. Information Density dimension, pronouns, modifiers, explicit grammar and logic markers, stance structures, and cognition nouns had positive factor loadings, whereas noun phrase structures, agentless passive, past tense, type/token ratio, and word length had negative factor loadings. Theoretical philosophy, quantitative political science, and qualitative applied linguistics texts had positive factor scores on this dimension, with higher involvement and elaboration, whereas theoretical physics, qualitative political science, quantitative applied linguistics, qualitative history, and quantitative physics texts had negative factor scores on this dimension, with denser information packing. In the Contextualized Narration vs. Procedural Discourse dimension, words and structures related to humans, time, communicative acts, *that* relative clauses, and phrasal and coordinating conjunctions had positive factor loadings, and technical, quantity, and concrete nouns, size adjectives, and passive voice had negative factor loadings. Qualitative history, qualitative political science, qualitative applied linguistics, theoretical philosophy, quantitative political science, and quantitative applied linguistics articles had positive scores on this dimension, whereas quantitative biology, theoretical physics, and quantitative physics articles had negative scores on this dimension. The

Human vs. Non-Human Focus dimension was formed by second and third-person pronouns, verbs relating to mental states, and progressive aspect with positive factor loadings, and attributive adjectives, topic adjectives, adverbs, and prepositions with negative factor loadings. Registers that discussed humans, like qualitative and quantitative applied linguistics and theoretical philosophy articles had positive scores on this dimension, while quantitative biology, qualitative political science, quantitative physics, quantitative political science, theoretical physics, and qualitative history articles had negative scores on this dimension. In the "Academese" dimension, features that explicitly represent research as empirical, such as abstract nouns, existence verbs, and adjective-based structures, had positive loadings, and time adverbials had negative loading. Positive scores were found on quantitative and qualitative political science and applied linguistics research articles, and negative scores were found on qualitative history, quantitative physics, theoretical physics, theoretical philosophy, and quantitative biology research articles. Gray's work demonstrates that there is variation across disciplines in academic research articles.

There have also been some studies using MDA approaches to describe medical research articles. Biber and Finegan (2001), for example, compared different sections of medical research articles' scores on Biber's (1988) dimensions, as well as the distribution of linguistic features identified by Swales (1990) in each section of research articles, using a sample of 20 texts. They found that introduction sections had more elaborated references than other sections, and methods sections were more informational, non-narrative, and impersonal than the other sections.

As MDA has been useful in providing descriptions of written registers in previous studies, it is likely to be a promising approach for exploratory studies on other registers, such as respiratory therapy research articles. Using Biber's (1988) established dimensions can be

practical for drawing comparisons across registers, but conducting a new factor analysis is recommended for specialized corpora (Friginal & Hardy, 2019), such as a corpus of respiratory therapy research articles, which would be likely to have scores that are similar to other written academic registers on Biber's dimensions. Conrad (2014) recommends using MDA in combination with qualitative methods, such as interviews, to have data from multiple perspectives.

1.2.1.3 Comparing Student and Expert Writing

To find ways that graduate students can improve their writing to be more similar to professional writing in their discourse community, many studies have compared theses or dissertations with research articles. Although the format of dissertations and theses is different from that of research articles, Hewings and Hewings (2002) argue that because journal articles can be considered reflective of the type of writing that graduate students should aspire to produce, comparing theses with research articles can provide useful information about the differences between student and expert writing. Different approaches to comparing student and expert writing have been used, but many studies comparing graduate student writing with published research articles have focused only on specific sections using either move analysis or comparisons of grammatical features. Ren and Li (2011) compared the rhetorical structure of abstracts in English theses and applied linguistics research articles, and they found that thesis abstracts tended to include all of the moves previously identified by Hyland (2000)—introduction, purpose, method, product, and conclusion—and while research article abstracts generally included these moves, many omitted one or more, such as the introduction, method, or conclusion. Graduate student writers allotted more space in the abstract to the introduction than professional writers, and professional writers had lengthier descriptions of the results. Thesis

abstracts were also more likely to mention limitations of the study. However, some of these findings may be impacted by word count limitations imposed by journals.

In the results sections of language teaching journal articles and masters' dissertations, Basturkmen (2009) used move analysis to examine patterns for commenting on results in discussion sections. She found that while research articles contained a move for stating results before a move for commenting on results, students reported results in the middle of the "commenting on the result" move. In the comments on the results, published writers often stated their own views before comparing results with previous literature, but student writers made comparisons without inserting their own opinions, at times putting more focus on the comparison literature than on their own findings. Expert writers also offered multiple possible explanations for their results more frequently than students. Samraj (2013) provides further insight into differences between student and expert use of sources in discussion sections. Comparing how information is cited in discussion sections of biology research articles and masters' theses, she found that student theses contained a higher percentage of integral citations than research articles. She also found that masters' theses used more citations for the purpose of comparing results to previous studies and explaining their results than research articles. Research articles used citations in evaluations of the field to discuss how the study fit in their discipline, and some authors used their findings to offer interpretations of the findings of previous studies. When offering recommendations, student authors used citations in recommendations for practical applications of the findings, whereas research articles contained more citations in recommendations for future research.

Other studies have compared the frequencies of grammatical features in student and expert writing. Ansarifar et al. (2018) compared features associated with phrasal complexity in

applied linguistics theses, dissertations, and research article abstracts. Research articles contained more pre-modifying nouns and adjective/noun combinations, -ed participle postmodifiers, and multiple prepositional phrases post-modifying nouns than graduate student abstracts. Other grammatical studies have compared features associated with how writers discuss previous research. Comparing the abstracts of research articles with abstracts of master's theses and PhD dissertations from multiple disciplines, Hyland and Tse (2005) found that expert writers used evaluative *that* more than student writers. Furthermore, students tended to use nonhuman subjects in clauses preceding evaluative *that*, expressing their authorial voice with this feature less frequently than expert writers. They also identified differences in how evaluative *that* was used across varying academic disciplines.

Multidimensional analysis can provide a fuller picture of the grammatical differences between student and expert writing. Pan (2018) used multidimensional analysis to compare applied linguistics theses, dissertations, and research articles from writers at different English proficiency levels. Although she noted differences between L1 and L2 writing, she also drew interesting comparisons between student and expert writing. She found that research articles had more features associated with "attitudinal" writing reporting on events in the past, whereas graduate student writing had more features associated with "descriptive" writing discussing events in the present. A comparison like this one could be insightful for exploring the differences between student and expert writing in respiratory therapy.

Analyzing Writing as a Process

In addition to studies describing academic texts, studies analyzing the processes that writers use to produce academic texts also lead to pedagogically useful information for EAP teachers. Guillén-Galve and Bocanegra-Valle (2021) argue that ethnographic approaches can

offer valuable insight for thick descriptions of the L2 writing process and writers' attitudes, and many ESP and EAP needs analyses have utilized ethnographic approaches (Basturkmen, 2003).

Interview data can give researchers insight about writers' thought processes, and it can be used to uncover challenges in the writing process that may not be apparent in the final, revised version of the texts that L2 writers produce (Zhu, 2001). Interview data that provides information about difficulties that L2 writers experience can be especially informative for writing teachers, because interviewees can describe the challenges in the writing process in detail. Some of the challenges of academic writing in a second language that have been identified through interviews with student writers are organization (Zhu, 2001), grammar (Bitchener & Basturkmen, 2006; Polat, 2013), expressing ideas clearly (Bitchener & Basturkmen, 2006), writing long enough compositions (Zhu, 2001), avoiding focusing on minor details (Bitchener & Basturkmen, 2006), writing slowly (Odena & Burgess, 2017), understanding scholarly literature that is cited (Bitchener & Basturkmen, 2006), and feeling discouraged from harsh comments in feedback from instructors (Odena & Burgess, 2017). As it is possible that different fields would pose different challenges, interviewing respiratory therapy students could lead to new discipline-specific information.

In addition to researching potential challenges in the writing process, it can be helpful to find solutions to these challenges, and interviews with L2 writers have been useful for identifying strategies for overcoming the challenges of academic writing. Some helpful L2 writing strategies that have been identified are seeking feedback from advisors (Odena & Burgess, 2017; Zhu, 2001), looking at examples (Zhu, 2001), and utilizing effective time management skills (Odena & Burgess, 2017). To look for this type of information, it may be helpful to find L2 writers who can be considered successful to learn about how they

accomplished their language learning and academic writing goals. Many universities are interested in finding ways to promote the success of their students, and student interview data has also been used to provide information about the types of writing support universities can offer that have helped multilingual writers succeed (Hirano, 2014). Studies on the resources that have helped students can also reveal some of the reasons that students do not choose to utilize all of the resources that are available. Naghdipour (2021) identified reasons that students did not take advantage of tutoring services in university writing centers such as wanting to avoid seeking help and lack of familiarity with social learning practices, confidence in student tutors' abilities, or awareness of the resources offered. With information about what is helpful and reasons students do not seek help, universities can aim to optimize their writing support services and encourage students to use them.

Another benefit of interview data is that researchers can hear about learners' perceptions of their own development throughout the writing process. For example, one of the L2 writing development findings that has been identified through interview methods is that language proficiency level differences may impact how writing development unfolds (Mazgutova & Hanks, 2021). Polat (2013) found that students at high proficiency levels mentioned improvement in structures related to verbs, whereas students at lower proficiency levels mentioned structures related to nouns, but their comments focused more on vocabulary improvement than grammatical improvement. Learning about how second language writers develop can be beneficial both for researchers and for participants. Although the goal of interviews in research is gathering information from participants, some research has found that participating in interviews can also be helpful for language learners because it provides an opportunity to reflect critically on their second language development and recognize their

progress, and interviews are even recommended as ESL classroom activities for these reasons (T.-Y. Kim, 2006).

Combining student interview data with instructor interview data can also lead to useful findings. Bitchener and Basturkmen (2006) combined information from instructor and graduate student interviews to identify problems in discussion sections of theses such as lack of connections between results and previous literature, lack of genre awareness among students, and unclear sentences. Some students focused more on grammar and language issues, but instructors focused more on content and organization. Interviews with instructors who can be considered expert writers in their field can also lead to insight about what is valued in the writing of specific disciplines, as seen in Hyland's (2000) study on disciplinary writing using individual and focus group interviews with domain experts. Focusing on fewer disciplines, J. C. Huang (2017) used interview data to explore maritime and oceanic sciences expert writers' opinions about writing research articles, drawing pedagogical implications and noting differences between the views of the experts consulted. Other studies on academic writing have used interviews with domain experts to gather very different types of information, like university faculty members' sense of belonging in a disciplinary discourse community (Kaufhold & McGrath, 2019), ways that instructors who are not necessarily writing teachers teach writing in their disciplines, and whether content instructors believe that they should teach writing (Zhu, 2004).

Although surveys are a bit less ethnographic than other approaches, to gather information about the academic writing process from large numbers of students or instructors in a specific academic discipline, surveys can also be very helpful. Evans and Green (2007), for example, used survey data to try to find common areas of difficulty among EAP writers, and they were able to make suggestions for EAP curricula. To look for solutions to potential challenges in EAP

writing, Dong (1998) surveyed graduate students who speak English as a second language and their advisors about the difficulties that they face while writing theses and the help that their advisors and the university could give them. In addition to identifying successful forms of support for L2 writers, surveys can also be used to identify successful strategies that can be taught to L2 writers. Baker and Boonkit (2004) utilized surveys and interviews to compare strategies used by "successful" and "less successful" EAP learners, which could be helpful for identifying potentially positive and negative writing habits. Using surveys can also provide other information that can be useful for needs analyses. Leki and Carson (1994) used survey data to gather information from ESL students in multiple disciplines about their academic writing needs, elements of writing instruction in their English courses that were helpful for writing in their disciplines, and ways that their ESL courses could have prepared them better for writing in their discipline. This type of information can be used in designing or improving EAP programs.

1.2.1.4 Technological Resources that Aid in L2 Writing

The way that language learners utilize technological resources during the writing process and the types of technological resources that are seen as helpful has also been explored using surveys, often in combination with interviews or other approaches. Naghdipour (2022) found that for academic writing, search engines, translation tools, and proofreading applications were the preferred electronic writing support tools of a sample EFL learners he surveyed. The search engines were used for finding reading materials to inform students' writing, the translation tools (primarily Google Translate) were used to check spelling and vocabulary and find synonyms, and the proofreading tools (primarily Grammarly) were used to seek grammatical feedback, especially when the humans who the participants typically asked for feedback were not available. Ethnographic data from L2 writers about their use of electronic tools during the writing process

can be particularly informative for finding ways to improve educational tools and form ideas for developing new tools (Rapp & Kauf, 2018).

L2 writers' use of technological resources is an ongoing research focus as the resources that are available continue to expand, and recently, there has been a growing interest in L2 writers' use of AI tools during the writing process. While there is concern among educators that students may use AI tools to avoid learning about writing, there are also questions about whether AI tools could be used to promote learning and teach students how to improve their writing, if they are used effectively (Imran & Almusharraf, 2023). For language learners, generative AI tools have the potential to provide input, examples, and information about collocations similar to authentic corpus examples currently utilized in language pedagogy, and they could be used to supplement corpora for language teaching (Crosthwaite & Baisa, 2023) or other currently-used teaching approaches. S. Kim et al. (2023) investigated whether ChatGPT could be useful for designing and implementing Task-based language teaching (TBLT) to help language learners with discipline specific writing. They gave ChatGPT information about the language learners and their language use contexts that would be gathered during the needs analysis phase of TBLT, as well as goals for a course and topics to cover. ChatGPT generated more specific competencies for learners to achieve, assignments, and a course schedule based on this information, and student work was submitted to Chat GPT for evaluation. They found that Chat GPT was useful for designing tasks related to the target domain with detailed instructions and scaffolding material. However, they found the information that ChatGPT gave learners about the target domain to be overly simplified. It provided learners with good feedback for revising their writing tasks, but S. Kim et al. described the feedback as "surface-level" at times, mostly addressing grammar. In addition to this limitation, they did not find ChatGPT to be useful for assessing

learners' work. They also raised concerns that the models that ChatGPT gave learners to follow gives learners a possible answer to the prompt, taking away their need to think about how to accomplish the task. While AI tools have the potential to promote language learning, taking away the need to engage in thinking and planning to accomplish a task is likely to hinder the language learning process. However, there are also arguments that if used well, ChatGPT and other generative AI tools could help language learners with metacognitive analysis of task expectations and planning how to accomplish tasks (Mizumoto, 2023). The way that language learners engage with technological resources available to them is likely to impact whether these resources promote or hinder their learning, and ethnographic approaches can lead to information about how language learners are utilizing generative AI tools and other forms of technology while accomplishing respiratory therapy writing tasks.

1.2.1.5 Connection between Reading and Writing

An important piece of the academic writing process is reading. When studying the EAP writing process, the role of reading cannot be ignored, since so much content originates from information learned through reading. Writers' comprehension of academic reading and their ability to rephrase information in their own words to support their arguments has a major role in the composition process (Campbell, 1990; Grabe & Zhang, 2013, 2016; Hedgcock & Ferris, 2018; Hirvela, 2004; Hirvela & Du, 2013; Koons, 2008; Stein, 1990). In a second or additional language in particular, paraphrasing and summarizing ideas from source texts can be challenging, as it requires comprehension skills (Davis, 2013; Grabe & Zhang, 2013). Underlying both the reading comprehension and the writing process, vocabulary plays a crucial role (M. Kim, Crossley, & Kim, 2020; Schmitt, 2005; Song & Reynolds, 2022), and in EAP contexts, discipline-specific vocabulary can affect reading comprehension (Gui et al., 2022).

Presumably for these reasons, Neumann et al. (2020) noted improvement in students' source-based writing after receiving instruction focused on vocabulary and reading comprehension.

Reading comprehension issues may lead academic writers to rely on quoting to avoid paraphrasing (L. Shi, 2010) or to engage in "patch-writing," or insufficiently altering the words and arrangement of a sentence to try to arrive at an acceptable paraphrase rather than paraphrasing more thoroughly (Howard, 1995). Due to the prevalence of paraphrasing issues in learner writing, Keck's (2006) categories of paraphrasing attempts, "Near Copy, Minimal Revision, Moderate Revision, and Substantial Revision," have become popular labels in L2 writing research.

In addition to reading comprehension and vocabulary funds, the conceptual understanding of why summarizing and paraphrasing is needed in academic writing may impact students' successful source-based writing (Hirvela & Du, 2013; Macbeth, 2006). Information from other texts is used in academic writing for various functions. Bereiter and Scardamalia (1987) categorize source-based writing into two processes: *knowledge telling*, which involves comprehension of reading material and ability to rephrase information, and *knowledge transforming*, which involves using information from texts to build an argument. Writers who have primarily practiced *knowledge telling* strategies in English classes may struggle with *knowledge transforming*, especially if they are not aware that their use of source information should entail more than summarizing (Hirvela & Du, 2013; Zhao & Hirvela, 2015). From another perspective, Grabe and Zhang (2013) categorize source-based writing processes as *summarizing* and *synthesizing* information. In academic writing, students combine all four processes, using summarizing and synthesizing for both knowledge telling and knowledge transforming, and the complex nature of these demands makes it an important area of research.

Though many potential challenges related to source-based writing in a second language have been identified, not all the research in this area has focused on problematic writing. Some studies, such as Petrić and Harwood's (2013) case study on citation practices, have researched L2 writers' successful integration of source information in academic writing. Petrić and Harwood (2013) describe how an L2 writer used sources to write definitions and support her arguments, and they found that the type of writing task assigned seemed to impact other ways that the writer chose to use source information. The role of task type suggests that research into the writing process in specific genres may be worthwhile. In addition to the impact of task on L2 writing, case studies with multiple participants have highlighted the role of individual differences in source-based writing practices. McCulloch (2013) analyzed the process of two master's students writing their dissertations using think-aloud procedures and noted differences in their levels of engagement with reading sources as they wrote. Using reading blogs, McGrath et al. (2016) also found differences among L2 students in reading strategies employed, and individual students even displayed inconsistent reading strategies over time. The source integration component of the writing process appears to be an individualized, context-dependent process.

It is clear that reading skills have the potential to heavily impact writing. Reading and writing may also have a two-way relationship; writing activities have been found to aid in reading comprehension, perhaps because they help learners engage with the content of reading material (Wickramaarachchi, 2014). In spite of the clear role of reading in the writing process, academic reading has been a less popular area of research than academic writing, but Grabe and Zhang describe reading as "every bit as problematic as writing when exploring reading-writing relations" (2016, p. 339). Since genre-based reading instruction has the potential to help students with academic reading, and the benefits can also spread to academic writing (Hyon, 2001), it is

worthwhile to continue to research the connection between reading and writing in a variety of academic contexts, and to continue to examine the reading-to-write processes of successful L2 writers. However, the reading-writing connections within the respiratory therapy discipline have not been explored.

Analyzing Writing Products and Processes: Using Corpus and Ethnographic Approaches Together

Riazi (2016) sees mixed method approaches as useful for studies on language problems that are multi-layered and requiring different types of knowledge to solve, and exploring discipline specific texts and the challenges they may present to L2 writers could very much be considered a multi-layered problem. Mixed-method approaches can thus be helpful in studies on writing. By mixing text analyses with other sources of data, information about the academic writing process and product can be presented side-by-side. Larsson et al. (2022) argue that combining quantitative and qualitative analyses is preferable in studies on language, cautioning that increased use of quantitative approaches in applied linguistics research in recent years has come at the expense of qualitative interpretation. They found that studies using exploratory statistical analyses were able to integrate the benefits of quantitative and qualitative techniques well. Gray et al. (2020) demonstrate how MDA can also be combined with move analysis in studies on disciplinary variation in academic writing, a combination that can provide two different types of broad, exploratory descriptions of a register, and Biber et al. (2007) argue further that both MDA and move analysis can be triangulated with other methods.

There have been studies that combine text analysis approaches with ethnographic approaches to present interesting data on academic texts and their writers, like Petrić and Harwood's (2013) study on citation practices that examined the citations an EAP learner made

and used interview data to learn about the writers' motivations for citation choices in specific papers. Ethnographic data can also be helpful for interpreting quantitative data. Conrad (2014) used interviews with civil engineering experts (instructors and practitioners), alongside interviews with students, to aid in her interpretation of MDA results in a project on writing in civil engineering. Ethnographic approaches can also aid in interpreting qualitative corpus data, and Swales (2019) recommends using interviews with domain experts with move analysis to have richer data than what move analysis alone could provide. Domain experts can supply information about what they are thinking when they apply the moves and their reasoning behind adhering to the patterns that are observed. Riazi (2016) however argues that mixed methods can go beyond simply using one source of data to interpret another, and can be mixed throughout all stages of the research process. For an exploratory study on how respiratory therapists write about research, a mixed-method approach using both corpus and ethnographic methods offers descriptions of discipline-specific writing and the challenges of EAP learners writing for respiratory therapy courses. Combining move analysis, MDA, interviews with experts and L2 EAP students, and surveys with L2 EAP students could lead to a description of what is written, what experts value, and what may be challenging for learners, which would have useful pedagogical implications.

The Present Study

Although there has been extensive research on writing research articles, source-based writing, and the reading-writing connection in scientific disciplines, and there are strong arguments in favor of further exploration of writing in specific discourse communities (see Appendix A for a list of studies on disciplinary variation in research articles), there is still a lack of research on the nuances of respiratory therapy writing. By using the methods that have been

successful in analyzing other academic registers, respiratory therapy writing patterns can be researched with the goal of drawing pedagogical implications. To this end, the present study addressed the following research questions:

1. What are the distinctive rhetorical and linguistic characteristics of published respiratory therapy research articles, and how do linguistic features in published research articles and master's theses compare?

2. From the perspective of students and faculty, what are the challenges that respiratory therapy students face in reading and writing respiratory therapy research articles?

3. What strategies or support help respiratory therapy graduate students meet the reading and writing challenges?

These questions were addressed by triangulating corpus data and ethnographic data to come to an understanding of the patterns and styles that can be found in respiratory therapy writing, the challenges that student writers face, the expectations that respiratory therapy instructors have, and ways to prepare English language learners for the academic literacy demands of graduate-level respiratory therapy studies in English-medium programs. By exploring these questions, pedagogical implications were drawn to aid in EAP teaching and curriculum development.

2 METHODS

Corpus approaches were used to describe the register of respiratory therapy research articles and find areas of writing that may be helpful for respiratory therapy EAP teachers to address, and the corpus data was used in combination with ethnographic data to provide information about the writing and reading process and the discourse community that can aid in interpreting the corpus data and drawing pedagogical implications. To analyze samples of respiratory therapy writing, a corpus of published respiratory therapy journal articles and respiratory therapy master's theses was compiled. To examine and interpret the co-occurrences of linguistic features in respiratory therapy journal articles, a multi-dimensional analysis of the corpus of respiratory therapy research articles and theses was conducted. The dimension scores of the corpus of master's theses and research articles were compared to look for pedagogical implications. To describe the rhetorical structure of the research articles, move analysis approaches were used to examine a subset of the research article corpus. Ethnographic data from a respiratory therapy master's program was also collected. Ethnographies can be conceptualized as studies describing a culture using qualitative interpretive methods that provide thick description of the findings, and "the methods of participant observation and in-depth interviewing are often referred to as ethnographic field methods whether or not one is doing ethnography" (Glesne, 2016, p. 23). Ethnographic approaches in this study included observations, interviews, and surveys over the span of one calendar year (3 academic semesters), with multiple points of contact with some participants (interviews + observations of the same students and professor, interviews of students whose theses are included in the Thesis corpus). Respiratory therapy instructors, students, and recent graduates were interviewed about writing, the integration of reading and writing skills, and common challenges in respiratory therapy

writing in a second language. A survey on this topic was also distributed to respiratory therapy students. The methods corresponding to each research question are summarized below in Table 2.

Table 2 Research questions and corresponding methods

Research question	Methods addressing the research question
What are the distinctive rhetorical and linguistic characteristics of published respiratory therapy research articles, and how do linguistic features in published research articles and master's theses compare?	Multi-dimensional analysis, move analysis
From the perspective of students and faculty, what are the challenges that respiratory therapy students face in reading and writing respiratory therapy research articles?	Survey, interviews with students, interviews with faculty
What strategies or support help respiratory therapy graduate students meet reading and writing challenges?	Survey, interviews with students, interviews with faculty, observations of writing support course

2.1 Corpora

As a representation of expert writing, corpus of 336 respiratory therapy research articles from *Respiratory Care*, *Chest, Respiratory Research,* and *Respiratory Care Education Annual* was collected. These journals were selected based on recommendations from respiratory therapy instructors, and given the rigorous peer review process that articles in these journals undergo, they could be considered suitable models of high-quality writing in the respiratory therapy field. Although it is possible that some articles could have been written by graduate students, these articles can still be considered exemplar models for other students, regardless of their authors' career stage, as they were approved by multiple domain-expert reviewers and published in selective journals. 84 articles from each journal were included in the corpus. The size of the corpus was determined based on the requirements for factor analysis; there should be at least five

times as many texts as the number of linguistic features used in the factor analysis (Friginal & Hardy, 2014), so at least 335 texts were needed to be able to do a factor analysis using the 67 features that Biber (1988) used for his original MDA. Only empirical articles were included in the corpus, and articles that were most recent at the time of collection were selected. All the articles were published within the last 18 years. Table 3 displays the publication timeframe of articles from each journal in the corpus. Note that *Respiratory Care Education Annual* publishes volumes less frequently than other journals, and each volume contains many non-empirical papers, so it was necessary to include some older articles in the corpus. Articles that had the same first author as an author from the thesis corpus were not included.

Table 3 Description of the Corpora

Corpus	Source	Texts	Years	Total Word Count
Research Article Corpus	Academic Journals	336	2006-2023	1,167,426
	Respiratory Care	84	2020-2023	
	Chest	84	2022-2023	
	Respiratory Research	84	2022-2023	

	Respiratory Care Education Annual	84	2006-2023	
Master's Thesis Corpus	4 Universities	91	2006-2024	707,844

To examine "novice" graduate-level student writing, a corpus of 91 respiratory therapy master's theses from multiple universities in the US was collected, including 79 theses that were available from the university where observations and interviews were conducted. Graduate student writing was selected as a representation of novice writing because graduate students are in the process of becoming a part of their discipline's academic culture and acquiring the writing norms of their disciplines (Casanave, 2008). The theses were completed between 2006 and 2024. They typically report on one research project. Acknowledgements, author's statements, CVs, dedications, and other such text that is not a part of reporting the study were removed to make the theses comparable to the research article corpus (i.e., the abstract, introduction, literature review, methods, results, discussion, and conclusion sections were retained), but the theses were generally a bit longer than published research articles. In all three corpora, author names, reference lists, appendices, tables, figures, and other such items were removed to analyze the prose in isolation. Parenthetical in-text citations with names were also removed from texts that had them using Python and manual checking to avoid including a large number of nouns that were not part of sentences.

In both corpora, it is possible that texts may be written by authors who use English as a first or second or additional language; authors' language backgrounds are not known. However, the comparison is still relevant for finding pedagogical implications for graduate students.

Whether scholars use English as a first or additional language, they learn unique conventions of academic writing in English that are not found in spoken conversational English, and even first language users undergo a process of learning academic writing (Hyland, 2016). Although the focus of this study is on finding implications for EAL users, the implications are also relevant to students learning to write academically in English as a first language. Graduate students could be considered novice writers regardless of their first language status, even though learning second or additional language writing may pose unique challenges. Similarly, published authors could be considered expert writers whether they are writing in their first or additional language. The differences between linguistic features in student writing and expert (i.e., refereed, published) writing are useful for identifying priorities for EAL writers in respiratory therapy, regardless of whether the features were produced by first or additional language writers. As Hyland (2016) argues, for academic writing genres, the distinction in communicative competence (specific to the genre) may outweigh the difference in first language background.

2.2 Part-of-Speech Tagging

The Multidimensional-Analysis Tagger (Nini, 2014a) was used to tag the POS and additional linguistic features in each corpus. This tagger is a publicly available program modeled after the Biber Tagger (1988) that tags all of the features used in Biber's (1988) *Variation across speech and writing*. A list of the tags and tagging criteria is publicly available in Nini's *Multidimensional Analysis Tagger Manual.* The MAT has been found to tag features with 97% accuracy (Nini, 2014b). A sample of tagged texts from the corpus for this project was examined for accuracy, and some recurrent tagging errors, particularly with the word *that*, were fixed using Python to replace the following incorrect tags with correct tags in all the text files:

- There were cases of *that* used as a verb complementizer that were mis-tagged as demonstrative pronouns or demonstrative determiners.
- In some cases, *that* used as a complementizer mis-tagged as a demonstrative pronoun resulted in erroneous *that* deletion tags in the RA corpus (this mis-tagging pair is not observed in other corpora tagged using MAT, and the reasons for this issue with this corpus are not clear).
- There were cases of *that* introducing adjective complement clauses tagged as a demonstrative pronoun.
- In some cases, *that* used as a relativizer (in subject and object position) was mis-tagged as a demonstrative pronoun.
- In preposition + *that* sequences, *that* was tagged as a demonstrative determiner or a relativizer in subject position, but it was more commonly a demonstrative pronoun in this environment.
- Some demonstrative determiners were mis-tagged as demonstrative pronouns.
- A few individual lexical items were consistently mis-tagged (e.g., *analyses* was tagged as a verb but all occurrences in the corpus were nouns, *RTs* was tagged as a verb but all occurrences in the corpus were nouns, *admitted* was tagged as a public verb but was only used in the context of "admitting" patients to medical facilities, *shows* was tagged as a noun when it was more frequently used as a verb).

When fixing the tagging, exceptions to the above generalizations (i.e., correctly tagged words in the same environment as commonly erroneously tagged word) were noted and re-fixed manually or using Python. AntConc (Version 4.2.2, Anthony, 2023) was used throughout the tag-fixing process to examine the contexts of the features in question. After fixing the above

errors, two samples (100 words each) from two randomly selected texts were examined for tagging accuracy. 94.9% of the words were correctly tagged.

2.3 MDA

A multi-dimensional analysis was used to examine the co-occurrence of linguistic features in the corpus of respiratory therapy research articles. After tagging all of the linguistic features that Biber (1988) included in his analysis of English speech and writing and normalizing the frequency counts automatically with Nini's (2014a) MAT, an exploratory factor analysis was conducted using SPSS. First, the assumptions of normality, lack of singularity or multicollinearity between variables, and linearity were examined to verify that the data was suitable for factor analysis. Some variables that Biber (1988) had included in his analysis of multiple registers were excluded from this study because their skewness and kurtosis scores were not within the acceptable range, and most of these variables occurred very infrequently in the respiratory therapy corpus and may be more common in spoken registers: amplifiers, contractions, discourse particles, indefinite pronouns, pro-verb *do*, public verbs, *seem* and *appear*, split infinitives, second person pronouns, stranded prepositions, synthetic negation, *that* deletion, and direct *wh* questions. Because these features did not meet the assumptions for factor analysis and are not likely to be relevant for academic writing, they were excluded. Other variables that had unacceptable skewness and kurtosis scores could occur in writing, but were very rare in the respiratory therapy corpus: hedges (nonnormal distribution was due to the high number of texts that did not contain them), third person pronouns (because most texts had 0), *that* adjective complements, time adverbials, *that* relative clauses on object position, and *wh* clauses, including *wh* relative clauses (on subject or object position). Although these features are relevant to academic writing, because of their low frequency in the respiratory therapy corpus,

excluding them was the best option for their unacceptable skewness and kurtosis scores. Linearity was assessed by examining scatter plots of each variable, but the variables that did not meet the linearity assumptions were the same as those that were eliminated because of normality. After excluding these, multicollinearity and singularity were assessed by examining the tolerance and VIF scores, and nouns and past tense verbs, which had high correlations with other variables, were eliminated for high (between five and 10) VIF scores. The 44 variables that met the assumptions that remained are listed below in Table 4.

Table 4 Variables Included in the Multi-Dimensional Analysis

Variables included in the multi-dimensional analysis
Average word length, type-token ratio, independent clause coordination, *be* as a main verb, *by* passives, agentless passives, causative adverbial subordinators, concessive adverbial subordinators, conditional adverbial subordinators, other adverbial subordinators, conjuncts, demonstratives, demonstrative pronouns, downtoners, emphatics, existential *there*, first person pronouns, gerunds, attributive adjectives, necessity modals, possibility modals, nominalizations, past participial clauses, present participial clauses, past participial WHIZ deletion relatives, present participial WHIZ deletion relatives, perfect aspect, phrasal coordination, prepositional phrases, pied-piping relative clauses, the pronoun *it*, place adverbials, predicative adjectives, private verbs, suasive verbs, predictive modals, adverbs, sentence relatives, split auxiliaries, *that* verb complements, *to* infinitives, *that* relative clauses on subject position, present tense, analytic negation

To confirm that the data was factorable, the data was checked for the presence of correlations between linguistic features that are greater than ± 0.30 (Tabachnick & Fidell, 2007, as cited in Friginal & Hardy, 2014), a Kaiser-Meyer–Olkin value of at least .70, and Barlett's Test for Sphericity yielding a significant chi-square value (Friginal & Hardy, 2014). All these assumptions were met. The Kaiser-Meyer-Olkin Measure for Sampling Adequacy (KMO = .750, middling) and Bartlett's Test for Sphericity (approx. Chi-square = 4,998.705, d.f. = 946; $p < .001$) indicated that the data was factorable.

The initial exploratory factor analysis was run on SPSS, selecting options to extract factors based on eigenvalues greater than 1 (rather than choosing a set number of factors) to allow flexibility to determine which number of factors best fit the data. The ideal number of factors, four, was determined based on the eigenvalues (above 2), also taking into consideration the slope changes on the scree plot of eigenvalues for each factor (Figure 1).

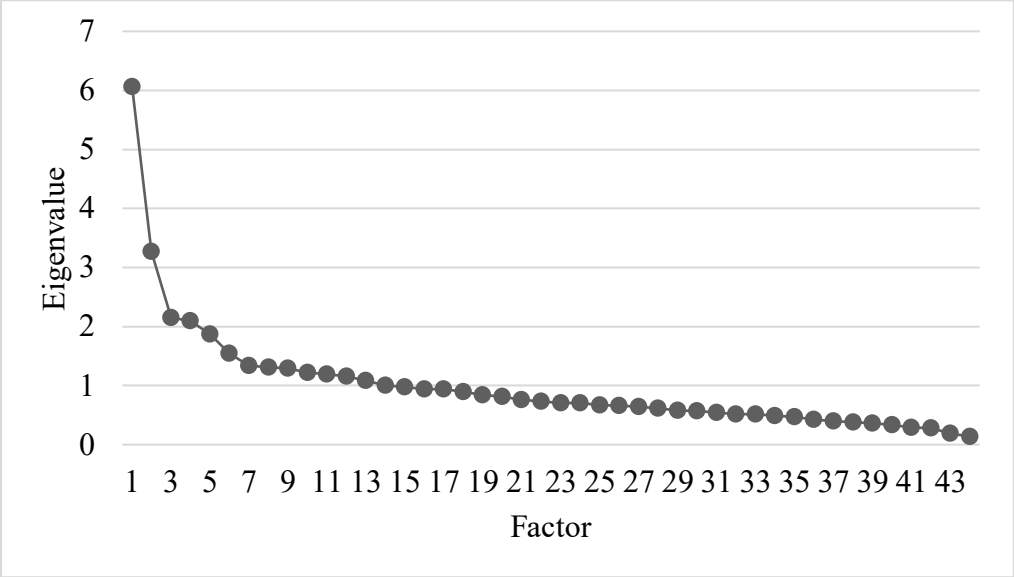

Figure 1 Scree Plot: Unrotated Factors

After the initial analysis, another exploratory factor analysis with Varimax rotation was run to aid in amplifying prominent features to lead to more interpretable results (Biber, 1988). Examining the eigenvalues, a four-factor solution still appeared to be most suitable, and the features with factor loadings of at least ± .30 and an initial communality of at least .25 were noted. To calculate a dimension score for each factor for each text, the z-scores of the normalized frequencies of the features identified as having strong loadings were summed. After finding the individual texts' scores on each dimension, the average scores for the whole corpora (separating research articles and theses) on each dimension were calculated.

The co-occurrences of the linguistic features with strong loadings in the rotated factors were interpreted from a qualitative standpoint to examine the functions of these combinations of features. Following Friginal and Hardy's (2019) recommendations, the complementary distribution of features in each factor was examined to get an idea of what is found on the positive and negative poles of each factor, the results were checked for overlapping features in each factor, corpus-based grammar books and previous MDAs were consulted to read about common functions of the linguistic features with strong loadings in each factor, and examples of how the features were used in the texts were searched to analyze the co-occurrence patterns from a functional standpoint. AntConc (Version 4.2.2, Anthony, 2023) was used to examine the features with high loadings, as well as their collocations (directly to the right and left of the features), to aid in the interpretation. After cycling through these steps and carefully examining samples from the corpus, the factors were given a name reflecting the functions of the features with strong loadings.

To identify significant differences in the dimension scores of each corpus (research articles and theses), a Welch test (suitable for unequal sample sizes) was conducted using SPSS. Additionally, to understand which features contributed to the observed differences, Welch tests were used to check for significant differences in the occurrences in the student and expert corpus of each feature with strong loadings on each factor using SPSS. These results were also used to aid in the qualitative interpretation of the differences that were found.

2.4 Move Analysis

To examine the rhetorical structure of the research articles, Swales's (1990) move analysis approach was applied. The moves and steps of each section of a subset of 52 research

articles were identified and described. To organize the data, NVivo (Version 14) was used to mark the steps, count the number of texts that contain each step, and aggregate examples of each step. Basturkmen (2014) recommends starting move analyses by checking how well move-schemes identified in previous research fit the texts in the corpus. For example, when describing the rhetorical moves of discussion sections in language teaching research articles and master's dissertations, she adapted a form of Ruiying and Allison's (2003) move-scheme for applied linguistics research articles. Following this recommendation, as a starting point to identify common moves, the texts were first examined to determine whether they followed patterns similar to Nwogu's (1997) moves for medical texts. Nwogu's framework was selected because it is based specifically on medical texts, encompasses entire journal articles (not just one section), has been checked against other corpora (e.g., Chang & Kuo, 2011), was determined using strong methods, and had similarities with the organization of articles in the RA corpus based on preliminary examinations of the texts. A subset of texts were examined and based on the observations, the steps in Nwogu's (1997) framework were revised or removed, some steps similar to those noted in other studies were added, and new steps that have not previously been noted were incorporated into the revised framework to fit the respiratory therapy data. The framework was continuously reworked until a model that fit a high percentage of texts was reached. After identifying a move-step pattern, another sample of texts from the corpus were inspected to determine whether the proposed framework fit a new subset of texts, or if further analysis of more texts was needed to revise the model, until finally reaching a conclusion to capture the similarities and common variations in the 52 articles analyzed. Throughout the analysis, sentences performing more than one rhetorical function could be labeled as completing more than one step or move. The percentage of articles containing each step was calculated.

2.5 Ethnographic Approaches: Setting

The Institutional Review Board of the data collection site approved the study, and participants provided informed consent to be included in the study (see the form in Appendices F-I). Participants were recruited from a respiratory therapy department that was accredited by the Commission on Accreditation for Respiratory Care (CoARC) at an urban university in the southeastern region of the United States that has a master's level respiratory therapy program (where observations also took place). The department was founded in 1969, and it has received awards from the American Association of Respiratory Care because the students who complete their programs have had a 100% pass rate on the Registered Respiratory Therapist Exam for a decade. While studying, students in the department have opportunities to work in internships in a local hospital under the supervision of instructors who work both at the university and the hospital. Instructors in the department also conduct research, and the research interests of the faculty members include aerosol medicine, asthma management, chronic obstructive pulmonary disease (COPD), smoking cessation, e-cigarettes, vaping, ICU acquired weaknesses, and respiratory therapy education.

At the university where participants were recruited, students who have a background in respiratory therapy can apply for the "traditional" master's program, and students who have a background in other healthcare specializations can apply for the "integrated" master's program that includes more background and training in respiratory therapy. The traditional master's program offers courses in multiple modalities (online, hybrid, and face-to-face), and it had approximately 47 students at the time of data collection. Many international students enroll in this program, and students who do not have high enough scores on the TOEFL or IELTS but have otherwise strong applications can be accepted, but often on the condition that they take ESL

courses at the university or complete an intensive English program before enrolling. The faculty of the focal department have connections with universities in Taiwan and Saudi Arabia, and many students hear about the program through these connections, but students from other countries also apply. In the traditional master's program, writing a thesis is optional, but many international students choose to write a thesis. Students who choose not to write a thesis complete projects instead and write a report of the project. Ideas for projects vary substantially, but some common types of projects are practical community-help initiatives or informational materials for patients, protocols for hospitals, and policy documents. A third option for traditional master's students who do not complete a thesis or project is to pursue Advanced Practice Respiratory Therapist (APRT) certification, which requires passing two exams on specific advanced practice topics. In the master's courses, notable writing assignments are given in a research seminar (where students start writing their theses or project write-ups), quantitative methods class (research papers, with a focus on writing methods and results sections), and leadership class (reflection papers). Aside from theses, projects, research papers, and reflections, other genres of writing in the traditional master's program that were identified by collecting course syllabi include annotated bibliographies, literature review papers, problem-solution papers (description of a problem observed in practice with a literature review and a research-informed suggestion for a solution), brief writeups on interview data, personal plans for developing leadership skills, online discussion posts, written responses to questions on activities, participation via chat in online synchronous classes, and PowerPoint presentations.

Faculty members in the focal respiratory therapy department had expressed some concern about international students' writing skills, and some believed that the intensive English programs that are designed to prepare students for undergraduate studies are not sufficient for the

demands of master's programs like theirs where students are expected to write research papers. By exploring the writing demands of their program, it is possible to offer suggestions for better preparing students for master's level studies in respiratory therapy in English-medium universities.

2.6 Observations

Following Guillén-Galve and Bocanegra-Valle's (2021) suggestions to use ethnographic approaches to learn about a discourse community to understand its writing practices from an informed background, a master's-level respiratory therapy research seminar course was observed. In the course selected for observation, students start to draft their master's theses and typically write the first chapter. The course was recommended for observation by the chair of the respiratory therapy department at the focal university to be able to observe instruction on writing in the discipline. The course lasted seven weeks, with five synchronous meetings lasting approximately two hours each time. Observations focused on what the instructor says about reading and writing, how students integrated information that they learned from reading into their writing, writing-related questions that students asked, and any information about the students' writing process that could be observed. Students in this course were also invited to participate in interviews. In addition to providing data about writing instruction, observations were helpful for learning content information about respiratory therapy. The observation consent form is provided in Appendix F.

2.7 Surveys

Respiratory therapy students were surveyed online using Qualtrics (https://gsu.qualtrics.com/homepage/ui) and in person (on paper) in a master's course. Surveys were anonymous with consideration for students' comfort sharing information about potentially

face-threatening topics such as language-related struggles. The survey, provided in Appendix B, addressed challenges in reading and writing research articles, sections that are particularly challenging to read and write, the extent to which the information learned in English courses help in respiratory therapy classes, skills learned in English courses that are helpful for reading and writing research articles, ways that English courses could have been more helpful, areas for improvement in reading and writing, reasons to choose to write or not write a master's thesis, and resources students use to cope with reading and writing challenges. Students from all English learning backgrounds (using English as an additional or first language) were invited to take the surveys. The focus of the project is on English learners, but the academic literacy challenges of students using English as a first language was collected for comparison purposes. The consent form for the survey, which students saw before the questions, is provided in Appendix G.

There were 31 survey participants. Three respondents identified English as their first language, and the other respondents used English as an additional language. Among those 28, participants started learning English at the ages of 5-21 years. They learned in academic settings, conversations, and from media (movies, songs).

2.8 Respiratory Therapy Faculty Interviews

Six respiratory therapy instructors who teach graduate students in the Respiratory Therapy Department at the university where observations took place participated in interviews. All interviews were conducted online via Zoom (Version 5.11.1). The interviews were semi-structured; there were pre-determined questions (provided in Appendix C), but other questions arose based on the information that participants provided. Topics in the individual interviews included reading and writing activities that they assign, what they want students to know how to

do, what students struggle with, whether and how they explicitly teach reading and source-based writing skills, what is valued in respiratory therapy research article writing, what types of issues get papers rejected that students should avoid, whether paraphrasing and textual borrowing is challenging for students, what they think students should know about research article writing, and what English programs for respiratory therapists should focus on.

The data from the faculty who participated in interviews was kept anonymous. While the topics of the interview were not likely to pose risk to the participants, it is possible that participants could share personal views on education or handling unintentional plagiarism that others may disagree with, so protecting their privacy was a priority. Pseudonyms were used to ensure that the instructors' identities are not traceable. Participants were given the option to choose their own pseudonym, and instructors who declined to choose were assigned names of famous scientists. All faculty participants are referred to with they/them pronouns throughout the dissertation to further protect their anonymity. Faculty participants were also offered an opportunity for member-checking the sections of the dissertation that discuss insight that they shared to ensure that they agreed with the analysis of the views that they expressed and that they are comfortable with what is written. The informed consent form for faculty interviews is provided in Appendix H.

2.9 Current and Former Respiratory Therapy Student Interviews

As interviews with EAP students can lead to useful information about their writing processes, practices, and challenges (Petrić & Harwood, 2013), 7 students of respiratory therapy who use English as an additional language were also interviewed via Zoom (Version 5.11.1). Topics included challenges in reading and writing research articles, sections that are particularly challenging to read and write, the extent to which the information learned in English courses help

in respiratory therapy classes, skills learned in English courses that are helpful for reading and writing research articles, ways that English courses could have been more helpful, areas for improvement in reading and writing, reasons to choose to write a master's thesis, and resources students use to cope with reading and writing challenges. These topics overlap with the survey questions, but interviews allow for more details and explanation from participants that may not surface in the surveys. The student interview questions are included in Appendix D. The interviews were semi-structured to allow for the flexibility of discussing potentially unanticipated topics that participants brought up.

English learners who have successfully completed their studies in English-medium programs can offer insightful information that may be useful for EAP teachers. In addition to the 7 students, 3 participants who had recently (in the past 3 years) completed the master's program in respiratory therapy at the focal university, 2 of whom learned English as a second language and enrolled in an intensive English program before beginning the master's program, were also interviewed about their experiences to look for ways that students overcome language-related challenges. Topics included the thesis writing process, challenges, useful resources, the integration of reading and writing, and whether writing a thesis was helpful for their careers. The interviews, which were conducted over Zoom (Version 5.11.1), were semi-structured, and questions are included in Appendix E. Table 5 displays the academic status and language-learning background of students and recently-graduated participants.

Table 5 Student Interview Participants

Pseudonym	Academic Status	English Language Background
Avogadro	Successfully completed respiratory therapy graduate studies	-Started learning English as a second language at the age of 12, usually with failing grades until starting English tutoring outside of school at the age of 14

		-Practiced with YouTube videos -Took English courses before college -Scored highly enough on IELTS for admission to master's program in the United States -Upon arriving in the United States, opted to take English courses in intensive English programs at two universities to improve writing skills
Fatin	Successfully completed respiratory therapy graduate studies	-Started learning English in college at a beginning level -Enrolled in an intensive English program upon arriving in the United States and took 4 semesters of English courses
Weston	Successfully completed respiratory therapy graduate studies	-L1 English user with a very limited writing instruction background -No writing courses for their first degree, but took a writing course at a community college before enrolling in the master's program -Has confidence in their writing skills, but does not like writing
Clapeyron	Enrolled in respiratory therapy program at the time of data collection, recently completed thesis defense, waiting for approval on thesis revisions	-Started L2 English classes in high school, but only learned the alphabet and "basic" vocabulary, courses did not include writing -Took one English course in college -Started respiratory therapy program that was supposed to have English as a medium of instruction, but the professors usually used their L1 instead -Learned English working in a hospital with multilingual coworkers using English as a Lingua Franca for 10 years where there was a lot of speaking and reading practice -Considers movies as their English teachers -Independently practiced writing paragraphs in English before taking the IELTS -Received a high enough IELTS score for admission to master's program in the US -Started writing papers in English for the first time as a master's student -Hoped to learn about research writing in the master's program to be able to research in the hospital where they work
MB	Enrolled in respiratory therapy program at the time of data	-Started learning English as a second language as a child, but self-identifies as a life-long English learner

	collection, writing a thesis, almost completed a draft	-Practiced English with parents (speaking, reading stories, watching movies), but predominantly used L1 at home -Started English classes at the age of 9 -Enrolled in an English-as-a-medium-of-instruction bachelor's program -Came to the United States for a master's program, did not take English courses in the United States
Mike	Enrolled in respiratory therapy program at the time of data collection, writing a thesis	-Uses English as a third language -Started taking English courses at school at the age of 5, took additional English courses in the summer as a child -Came to the US for a master's program, did not take English courses in the United States
Lussac	Enrolled in respiratory therapy program at the time of data collection, started a thesis and changed their mind because it took too long	-Started learning English at school at the age of 16, but the courses did not have a lot of writing -Took English courses in college in home country -Took English courses in the United States before starting a second bachelor's program in the United States
Amonton	Enrolled in respiratory therapy program at the time of the data collection, completing a project write-up instead of a thesis	-Started learning English at school from the ages of 6-12, but was very afraid of English class and just aimed to pass without investing in learning; believed that learning English was a challenge that couldn't be achieved without traveling to another country -After the second year of undergraduate studies, went to the United Kingdom for four years to learn English, and did not feel like there was improvement at first but started to perform better in undergraduate courses after returning home -Studied English at a university in the United States, with a goal of learning how to use different grammatical tenses; learned English writing for the first time learned about the "culture" of writing in English
Cannizzaro	Enrolled in respiratory therapy program at the time of the data collection, completing advanced practice program instead of thesis because of needing advanced board certifications	-Came to the United States, enrolled in a private English intensive language school before undergraduate studies and stayed with a host family who spoke English for 8 months -Completed undergraduate studies in an English-medium program in the United States,

		became more proficient in English while studying
Wama	Enrolled in respiratory therapy program at the time of the data collection, completing a project write-up instead of a thesis because they do not like writing	-Studied English in the US right before getting an undergraduate degree in the US; claims that this was the first time to learn English because they did not learn anything from middle school, high school, or university English classes in their home country

Students' rights and research ethics were considered throughout the data collection process. Students were given consent forms (see Appendix I). The language learning process can be very personal, and student participants may not want others to know about reading and writing difficulties that they faced or all the challenges behind the revised, polished thesis that is available to the public. To protect students' identities, they were given pseudonyms. Like the faculty participants, they had the option of self-select pseudonyms, and participants who did not want to choose a pseudonym were assigned names of famous scientists. All students, regardless of gender identity, are referred to with they/them pronouns to further protect their anonymity. To compensate student interviewees for their participation, they were offered gift cards with $20.00 value (or the equivalent in other currencies for participants living outside of the United States).

2.10 Analysis of Interviews

Interviews were transcribed automatically, and the transcriptions were manually corrected. One interviewee preferred not to be recorded, so notes were taken during the interview instead of recording. The transcripts of recorded interviews and notes of the unrecorded interview were coded thematically using NVivo (Version 14) to organize the coded data using Braun and Clarke's (2006) steps for thematic analysis. The steps include reviewing and becoming familiar with the data, forming initial codes, deriving themes from the codes, checking the themes, assigning names to the themes, and writing the results. Examples of coded interview

quotes are provided in Table 6. In the examples, the initial codes for talking about ideas with a professor, planning or outlining with professors, and revising from instructor feedback were consolidated into one theme, support from instructors. Themes relating to the research questions were included in the results. To check for intra-rater reliability, one interview was randomly selected for re-coding a week and a half after the initial coding was finalized. The intra-rater reliability of the coding was examined using NVivo's (Version 14) automatic calculation of percent agreement. The mean percent agreement score for all codes was 99.5%, including differences that were determined to be due to differing boundaries of the same code on the same sentence rather than differences in coding opinion.

Table 6 Examples of coded quotes

Theme	Code	Example quote
Support from instructors	Talking about ideas with a professor	"At that time, luckily my supervisor was teaching that class, so I spoke with him about, I have doubts and I'm nervous about it because I didn't find more than like three or five articles." (Avogadro)
	Planning or outlining with professors	"Sometimes I have difficulty, as I mentioned before with my project from how to start, but once Professor [name] give me just the skeletal or the outline, I did it, and I remember I finished it in two days. Yeah, because I already have the idea." (Amonton)
	Revising from instructor feedback	"For each step, I finished, I sent it and she give me a comment and I did what she wants, like this." (Fatin)

2.11 Positionality

Since there were methods that required manual analysis of texts, my training and educational background may have impacted the project. Although my own experience learning how to write research papers has been largely outside of English classes, my background in applied linguistics and my experience teaching English has led me to think that EAP writing

teachers who teach graduate students should help prepare them for writing research articles. As an EAP teacher, I have met students from many different educational backgrounds with varying levels of focus on source-based and research article writing who all plan to enroll in academic programs that will require them to write research papers. In EAP classes where everyone has such different English academic writing backgrounds yet will soon be taking classes alongside students whose entire education has been in English-medium programs that have had some focus on academic writing, I have felt like it is important to find efficient approaches to preparing students for the writing demands of graduate education. However, many EAP textbooks and curricula are written for students planning to start undergraduate studies, with the exception of Swales and Feak's books for graduate students. Having studied applied linguistics, I believe it would be ideal for EAP students to practice writing tasks that are similar (both in terms of genre and in terms of topic) to what they will need to write in their future academic careers, but I have found myself teaching students who want to pursue a master's degree in respiratory therapy using curricula that primarily focus on essays, usually on academic topics that students from varying disciplines may be familiar with, such as pollution. Although I felt like these types of writing tasks are not ideal for students who want to study respiratory therapy at a graduate level, there was not enough information available in EAP research to design ideal writing tasks. When teaching students in other disciplines (such as dentistry, ecology, and computer science), I have been able to read about the writing that they will be likely to need to know how to teach from an informed perspective, but limited information on writing in respiratory therapy is available. I initially became interested in this area of research because it seemed like a large gap in the EAP literature, and frequently teaching respiratory therapists in EAP classes made me experience the

consequences of the gap. With this teaching background, I was interested in the outcomes of the study and how they could inform pedagogy.

My training in applied linguistics had the potential to impact the analysis of the texts and my interpretations of the results. I had pre-conceived ideas about how research articles are written based on my own educational background, but it was important to try to ensure that my funds of knowledge did not obscure my analysis of writing in another discourse community with different writing norms. My background in linguistics and intercultural communication had led me to believe that communication norms may develop differently in each discourse community, and I agreed with Hyland's arguments that this trend could apply to academic disciplinary communities. Findings from previous literature on academic writing had given me a preconceived assumption of disciplinary variation and writing in scientific disciplines. Although reviewing previous literature is important and it can be helpful in deciding the design of a study and forming hypotheses, it had potential to influence what I was expecting to find and thus taint my view of the data. To decrease the risk of these potential limitations, a respiratory therapist was on the dissertation committee to review the analyses. Member checking from respiratory therapy faculty participants was also helpful to ensure that their views were represented correctly.

Since some of the data collection involved interaction with the participants, the way that the participants saw me could have also impacted the data they provided me with. From the perspective of participants who are respiratory therapy instructors, I was a student from another department. My position as a student may have been helpful in gathering information from them, because as university instructors, they were eager to help any students in the university, and since I am clearly an outsider to their discourse community, they may have felt like they were

teaching me about how to write in their domain. Being a student and an outsider also had benefits for observations. Sometimes instructors do not like the feeling of being observed, but the respiratory therapy professor with many years of teaching experience was not likely to worry about a graduate student watching them teach. A potential limitation of the student position is that some of the faculty participants may have felt the need to present themselves professionally and answer questions in a way that is seen favorably in the academic community. It is possible that they could have been reluctant to share any potentially controversial views of writing or teaching with a student.

From the perspective of student participants, I was another graduate student, which might have made it easy for them to discuss their heavy academic workloads and the challenges of academic literacy. I have experienced the need to read four hundred pages a week while completing writing assignments and teaching courses, and the heavy workload of graduate studies has at times impacted the quality of writing that I have been able to produce. However, my own experience with academic literacy may not be fully comparable with the participants' experiences, so while I was able to use my positionality to find common ground with the student participants, I was careful to not let it impact my interpretation of the information they gave me. Needless to say, there are notable differences between applied linguistics and respiratory therapy studies, and since most of my graduate level education has been in my first language, I expected that participants completing a program in their second/additional language would have different experiences with academic writing and reading. I aimed to examine the data on students' experiences without letting my own experiences influence my interpretation, but I tried to use my student position as a connecting point to make the students comfortable talking to me about reading and writing challenges. Although I may be seen as another graduate student, for many

participants, I was seen as an English teacher. This may have been helpful because the student participants were very open with me about their language learning experiences. It is possible that they may have expected English teachers to be understanding of their language learning process, and they were willing to share personal details about academic literacy challenges. I tried to make sure to present myself as a nonjudgmental listener who is an outsider to their discipline and respects their insight.

3 RESULTS & DISCUSSION FOR RESEARCH QUESTION 1: WHAT ARE THE DISTINCTIVE RHETORICAL AND LINGUISTIC CHARACTERISTICS OF PUBLISHED RESPIRATORY THERAPY RESEARCH ARTICLES, AND HOW DO LINGUISTIC FEATURES IN PUBLISHED RESEARCH ARTICLES AND MASTER'S THESES COMPARE? PART 1: MDA RESULTS

To compare student and expert writing, a multi-dimensional analysis of the lexico-grammatical features in the thesis corpus (representative of graduate student or novice writing) and RA corpus (representative of expert writing) was conducted. The exploratory factor analysis results revealed grammatical features that are prominent in respiratory therapy writing as well as differences between student and expert writing. This chapter provides the MDA results and the interpretation of the functions of prominent features. A four-factor solution fit the data the best (with a 30.88 cumulative percentage of Initial Eigenvalues), and Varimax rotation was used to amplify the loadings of prominent features. The four-factor solution with Varimax rotation had a 24.91 cumulative percentage of Initial Eigenvalues (Total Variance Explained). Table 7 displays the features with strong loadings (at least ±0.30) for each of the four factors.

Table 7 Exploratory Factor Analysis with Varimax Rotation: Features with Strong Loadings

	Features with strong positive loadings	**Features with strong negative loadings**
Factor 1	Present tense verbs, infinitives, predictive modals, pronoun *it*, private verbs, *that* relative clauses on subject position, necessity modals, *that* verb complements, *be* as a main verb, emphatics, existential there, demonstratives, suasive verbs, adverbial subordinators (not including causative, concessive, or conditional subordinators)	Agentless passive, past participial clauses, attributive adjectives
Factor 2	Predicative adjectives, *be* as a main verb, analytic negation, causative adverbial subordinators (*because*), demonstrative pronouns, pied-piping relative clauses (preposition + relative	Phrasal coordination

	clause), conditional adverbial subordinators, concessive adverbial subordinators, downtoners, adverbs	
Factor 3	Average word length, nominalizations, gerunds, infinitives, suasive verbs	Agentless passive
Factor 4	Split auxiliaries, adverbs, type-token ratio, possibility modals, first person pronouns	*No features with loadings ≤ -0.30*

3.1 Dimension 1: Lengthy vs. Concise Description- Positive Dimension 1 Features

The positive pole of the first factor included present tense verbs, infinitives, predictive modals, pronoun *it*, private verbs, *that* relative clauses on subject position, necessity modals, *that* verb complements, *be* as a main verb, emphatics, existential *there*, demonstratives, suasive verbs, and adverbial subordinators (not including causative, concessive, or conditional subordinators). As shown in Figure 2, the thesis corpus had a positive Factor 1 score (8.44). In the context of the corpora, combinations of Factor 1 features were primarily used to provide descriptions, and Dimension 1 was named "Lengthy vs. Concise Description." Present tense verbs were used for stating research questions, reviewing findings of other studies (what is currently known), describing the current state of healthcare/treatment practices/disease scope, describing equipment, explanations and definitions, summing up findings, making what Swales (2011) referred to as "topic generalizations" in introductions, expressing opinions, describing findings (e.g, __ *is significant*), and describing the study. In academic writing in general, the present tense can at times be used to describe states without time restrictions (Biber et al., 2021), and many of the examples of present tense in the corpus, such as its use in research questions, fit this category of present-tense usage. Gray (2015) also noted that present tense can be used to describe relationships, especially with the verb *be*. This function could be observed in the thesis corpus, as in the example "…the younger the person, the more significant **is** the impact of international

experience, which **contradicts** Zorn's findings" (AbuNurah, 2016, Thesis Corpus). In the theses, where present tense was more frequent, common verbs used in the present tense included *be*, *have*, *do*, *include*, *provide*, and private verbs (another feature with strong loading on Dimension 1) like *indicate* and *show*. Present tense occurred in clauses modifying nouns; *that* relative clauses with *that* in the subject position often used present tense. The pronoun *it*, infinitives, *be* as a main verb, and infinitives often appeared together in "it is [adjective] to" sequences. In some cases, *it* in this sequence could be used in expressions of stance (Gray, 2013), as seen in this example from the thesis corpus displaying attitudinal stance: "**It**_PIT **is**_VPRT [BEMA] important **to**_TO assure **that**_THVC the one who **wears**_VPRT gloves **should**_NEMD touch the *clean*_JJ body sites before the *dirty*_JJ ones" (Alherbish, 2020, Thesis Corpus). Infinitives can also convey stance when they come as complements of stance adjectives or verbs (Biber, 1988). Additionally, Biber (1988) explains that *be* as a main verb often provides description, as it is frequently followed by predicative adjectives. This pattern was also observed in the thesis corpus, where *be* as a main verb was most commonly followed by predicative adjectives, which had a loading of 0.28 on Dimension 1 (almost meeting the criteria for inclusion as a strong Dimension 1 feature).

Figure 2 Dimension 1 Scores

Modals also had a role in descriptions in the thesis corpus. Necessity modals, loading strongly on this dimension, were used to convey stance (Biber, 1988), illustrated in the example above. In the thesis corpus, there were recommendations for practice and education with strong assertions of opinions using *must*, like the following example: "*Further*_JJ studies with *bigger*_JJ samples **must**_NEMD be conducted **to**_TO reach **more**_EMPH *conclusive*_JJ results" (Al Ahmad, 2021, Thesis Corpus). Prediction modals also loaded heavily on this dimension. In the thesis corpus, they were used to indicate how the paper *will* be organized, implications (with *would*), habitual *will* (for describing things that usually happen), and sometimes recounting methods (using future). Prediction modals were commonly preceded by *it* or *that* in the subject position of relative clauses.

Suasive verbs, including private verbs, public verbs, and communication verbs, were used to report speech or writing and describe decisions, or for some verbs, the study. They were often preceded by infinitives or followed by infinitives or *that* verb complements, which enabled them to contribute to building descriptive discourse. The most common suasive verbs in the

thesis corpus were *asked*, *determine* (in the infinitive), *required*, and *recommended.* Surprisingly, it was common for the subject of *ask* to be the research question rather than a human (e.g., "the second research question asks…"). In these cases, its role was to describe the study rather than report speech. Private verbs were commonly used in descriptions of statistical information (__***revealed*** *a significant difference*), and the most common private verbs in the theses, which used them more frequently, were *found*, *showed/shown*, *determine*, *learning*, *revealed*, and *indicated*. In other registers, mental verbs (a sub-category of private verbs) + *that* clauses are often used to convey stance (Biber et al., 2021), but in the thesis corpus, many cases of private verbs paired with *that* verb complement clauses were used for describing results objectively (___ *found that* ___). Private verbs were also used for premodifying nouns (in -ing or -ed form, such as *perceived harm*), describing participants' mental processes (*feel comfortable*) or describing trends in the data. Private verbs were commonly followed by *that* verb complements, *the* or *a* (often with statistical information, such as *[private verb] a significant difference*), infinitives, *in* (*shown in table/figure/appendix*, *expected in...*), and *that* deletion. Biber et al. (2021) found that private verbs are often used with inanimate subjects in human writing, and in the thesis corpus, both human and inanimate subjects were present.

Existential *there* was commonly used for describing statistical findings (in statements like, *there was a correlation/statistically significant difference*) or a need for more research, and in the research article corpus, it was also used for describing conditions in the methods. It was frequently preceded by a private verb and *that* and followed by a form of *be* and *significant* in the thesis corpus, as in the example, "it can be concluded that there is a significant relationship between these variables" (Alharbi, 2023, Thesis Corpus). This function could fall under Biber's (1988) description of existential *there* for presenting new information.

Adverbial subordinators (excluding causative, concessive, and conditional subordinators), which are used for logical and grammatical relationships (Gray, 2013) were primarily used in the thesis corpus for comparing, indicating time relationships, and introducing a contrasting idea. These observed functions in the student writing partially align with Biber et al.'s (2021) findings that adverbial conjuncts in academic prose are mostly used for concession and contrast. The most common adverbial conjuncts were *while* and *since*.

Emphatics and demonstratives had simpler descriptive functions. Emphatics commonly occurred after *be* as a main verb or private verbs in the thesis corpus. In many cases, emphatics were used to describe comparisons, and *more* and *most* were the most common emphatics in the thesis corpus. Emphatics were commonly followed by *than* and *important* in the theses. Demonstratives indicate specificity. About a third of the occurrences of demonstratives in the thesis corpus were in the phrase "this study," and "chapter" also commonly followed demonstratives.

3.2 Dimension 1: Lengthy vs. Concise Description- Negative Dimension 1 Features

The features with strong loadings on the negative pole of Dimension 1, attributive adjectives, past participial clauses, and agentless passives, had two main functions: drawing comparisons and outlining procedures. Both functions are illustrated in the excerpt below, describing procedures for collecting measurements before and after interventions to compare:

> **Pre-**_JJ spirometry was performed [PASS] in all subjects. **Post-**_JJ spirometry, measurement of lung volume by the nitrogen washout method, and measurement of the diffusing capacity of the lungs for carbon monoxide (DLCO) **were done** [PASS] after grant funding **was expanded** [PASS], and **were determined** [PASS] for most of the subjects. The percentage of subjects with obstruction, **based** [PASTP] on an FEV1/FVC

> ratio 0.7, **was determined** [PASS] on the basis of **post-**_JJ measurements when **available**_JJ and on the basis of **pre-**_JJ measurements when not. (Diaz del Valle et al., 2022, RA Corpus)

The research articles had a negative Dimension 1 score, using these features for concise descriptions of comparisons and procedures. Attributive adjectives, which are frequent in academic writing in general (Biber et al., 2021), have been described as an "integrated form of nominal elaboration" (Biber, 1988, p. 105), or a form of dense information packing (Hardy & Römer, 2013), providing description very briefly. In the RA corpus, discipline-specific and academic phrases contributed to the prominence of attributive adjectives; the most common attributive adjective in the RA corpus was *respiratory*, and other common examples were *clinical*, *pulmonary*, *significant*, *high/higher*, *low/lower*, *severe*, *additional*, *previous*, and *mechanical* (in phrases such as *mechanical ventilation*). This aligns with what was previously found in a corpus of pulmonology research articles, where attributive adjectives were also observed filling the need for specific details about each topic (Cox & Friginal, 2023). In the RA corpus, specificity also had a role in the high number of adjectives, in phrases such as ***acute hypoxemic respiratory*** *failure*. As Atkinson (1992) had found that medical research articles had more explicit reference over time, it is not surprising that attributive adjects were prominent in this corpus. Participial forms have a similar role, as they can be used for elaboration and for integrating information (Biber, 1988). In the RA corpus, the most common verbs in past participial clauses were *compared*, *based*, and *followed*, and the contexts containing past participial clauses often involved comparisons and steps in procedures (*followed by*; *followed* was also used for ranking comparisons). The comparative functions of the Dimension 2 features can be seen in the excerpt below:

> The etiology of the *simulated*_JJ *cardiac*_JJ arrest *was* [PASS] identified more often during *evaluable*_JJ resuscitations supported by a *telemedical*_JJ intensivist consultant (22/32 [69%]) *compared* [PASTP] with control resuscitations (10/34 [29%]; *P* = .001), but *other*_JJ measures of resuscitation quality, resuscitation team performance, and participant experience did not differ between intervention groups. (Peltan et al., 2022, RA Corpus)

Agentless passives are used to direct the reader's focus to a verb rather than the agent of the verb (Biber, 1988). Passive forms are common in procedural discourse in which the agent can be assumed (Biber, 1988). They were also prominent in Hardy and Römer's (2013) "Procedural Discourse" dimension, especially for texts from hard sciences. Gray (2013) also found passive voice to be common in scientific fields. In the RA corpus, the most common verbs in the agentless passive were *used*, *associated*, *performed*, *found*, *considered*, *shown*, *conducted*, *reported*, *included*, *observed*, and *defined*. Using these verbs in the passive voice allowed writers to describe their own procedures and conclusions without repeated self-mention and describe previous literature without placing focus on the authors cited.

3.3 Dimension 1: Significant Differences in Dimension Scores- Expert and Student Texts

There was a significant difference between the Dimension 1 scores in texts written by student and expert writers, Welch's $t(195) = 195.71$, $p < .001$. The average Dimension 1 score of the expert writers was -2.29, whereas the average Dimension 1 score of the student writers was 8.44. All of the features with strong loadings on Dimension 1 contributed to this difference. The student writers used all of the features with strong positive loadings significantly more than the expert writers, and the expert writers used all of the features with strong negative loadings

significantly more than the student writers. The results of the Welch test for the individual features are displayed below in Tables 8 and 9.

Table 8 Welch test results: Features with strong positive loadings on Dimension 1 in the student and expert corpus

	Welch's *t*	Degrees of freedom	Significance
Present tense verbs	82.45	131.23	0.000
Infinitives	26.18	214.40	0.000
Predictive modals	66.21	123.71	0.000
Pronoun *it*	57.14	143.82	0.000
Private verbs	27.94	136.66	0.000
That relative clauses on subject position	59.64	129.23	0.000
Necessity modals	16.61	139.08	0.000
That verb complements	45.15	125.69	0.000
Be as a main verb	22.59	183.85	0.000
Existential there	48.87	144.26	0.000
Demonstratives	25.96	154.03	0.000
Suasive verbs	5.58	128.87	0.020
"Other" adverbial subordinators	19.10	214.72	0.000

Table 9 Welch test results: Features with strong negative loadings on Dimension 1 in the student and expert corpus

	Welch's *t*	Degrees of freedom	Significance
Attributive adjectives	20.28	159.33	0.000
Past participial clauses	14.29	272.80	0.000
Agentless passives	28.90	165.10	0.000

The differences in how student and expert writers form descriptions is clear in the texts containing many Dimension 1 features. Expert writers form concise descriptions with attributive adjectives and past participial clauses, whereas students use wordier structures. For example, as noted above, wordier sequences of the pronoun *it*, infinitives, *be* as a main verb, and infinitives (*it is [adjective] to*) were common forms of description in the thesis corpus. In particular, there was an overuse of variations of *it is important* and *it is important to* in student writing.

Examining these parallel sentences, each of which describe the importance of the study near the beginning of the abstract, it can be seen how published authors concisely described why the study mattered, while a student author formed a wordier description utilizing positive Dimension 1 features with an *it is important to* phrase, as seen in the following examples: “Identifying the factors associated with *ineffective*_JJ control of *spontaneous*_JJ breathing with ECMO may advance our *pathophysiologic*_JJ understanding of this syndrome.” (Spinelli et al., 2020, RA Corpus) and “Because *clinical*_JJ instructors **impact**_VPRT **learning** [PRIV] process of teaching the *next*_JJ generation , **it**_PIT **is**_VPRT [BEMA] important **to**_TO identify the *effective*_JJ teaching characteristics **that**_TSUB **contribute**_VPRT to the clinical_JJ success of the student from the perspective of RT faculty.” (Siraj, 2015, Thesis Corpus)

Student authors used other features in lengthy descriptions as well. In the examples below describing participants, the published author concisely packed details using negative Dimension 1 features, whereas the student author provided details using positive Dimension 1 features.

> Exposed subjects were *hired* [PASS] as flight attendants at a *mean*_JJ age of 23.8 ± 4.8 years, *exposed* [PASTP] to airline SHS for 16.1 ± 9.3 years, and stopped *being exposed* [PASS] 27.5 ± 9.4 years before study enrollment. SHS exposure *was not associated* [PASS] with differences in race, ethnicity, past_JJ smoking history, or comorbidities compared with unexposed_JJ subjects (Table 1). (Diaz del Valle et al, 2022, RA Corpus)

> Although **there**_EX **are**_VPRT a total of 160 students and 20 CIs in **these**_DEMO 3 institutions,141 RT students and 15 CIs volunteered **to**_TO participate in **this**_DEMO study. **While**_OSUB RT students were *included* [PASS] in **this**_DEMO study, exclusion criteria consisted of students from *other*_JJ levels of *respiratory*_JJ therapy programs,

> such as associate, diploma, and bridge. Inclusion criteria for *clinical*_JJ instructors included at least one year or **more**_EMPH of experience in clinical education. The *part-time*_JJ CIs were excluded [PASS] from **this**_DEMO study. (Alahmadi, 2015, Thesis Corpus)

In these examples, the published author lists characteristics of the participants in one sentence and provides more details in the next sentence, whereas the student goes back and forth between listing inclusion and exclusion criteria. Some other combinations of Dimension 1 features used to form lengthy descriptions include existential *there* + *be* + other structures and private verbs + *that* verb complements + existential *there* + present tense verbs or necessity modals. Dimension 1 features that are often followed by more words, like *that* relative clauses on subject position (used to modify nouns), and *it* + *be* as a main verb + non-Dimension 1 features (a noun or adjective phrase), also create long descriptions. Although these sequences are long, most of the time, these structures were not incorrect. However, there were occasional mistakes contributing to the Dimension 1 scores, like the missed opportunity to use agentless passives, a negative Dimension 1 feature, in the following example: "RTs who **work**_VPRT for 8 hrs **found** [PRIV] **to**_TO **be**_VB [BEMA] **more**_EMPH satisfied their job compared to RTs who **work**_VPRT for 12 hrs" (Alosaimi, 2021, Thesis Corpus). Instead of using passive voice for the verb *found*, the student author used active voice with no subject. There were also some cases of present tense and predictive modals (will), which are positive Dimension 1 features, in descriptions of methods conducted in the past:

> All participants **are**_VPRT [BEMA] currently in their *first*_JJ year of a *professional*_JJ program **that**_TSUB **requires**_VPRT [SUAV] them **to**_TO **be** [BEMA] at a minimum juniors in college, therefore none **will**_PRMD **be** [BEMA] under the age of 18… No

> names **will**_PRMD *be used* [PASS] for data collection. Also, **there**_EX **will**_PRMD be no risks associated with *being included* [PASS] in **this**_DEMO study. (Alhaykan, 2015, Thesis Corpus)

In this example, the positive Dimension 1 features were avoidable, as past tense could have been used. Hardy and Römer (2013) describe past tense as more common for relating procedures, and present tense as more common for argumentation and making predictions. Negative Dimension 1 features were particularly notable in the RA corpus in descriptions of methods and comparisons. Many student writers used other forms for these functions that were grammatically correct but less reflective of the style of published RAs. The excerpts below display how comparisons were formed using negative Dimension 1 in a research article and positive Dimension 1 features in a thesis. The published authors utilized passive voice, whereas the student author utilized active voice with participants surveyed and constructs investigated as subjects.

> In the subgroup analysis by outcome, *higher*_JJ reliability *was detected*_[PASS] in MIP, *followed* [PASTP] by MEP and SNIP (e-Fig 2). When grouping by diagnosis, *lowest*_JJ *overall*_JJ ICC *was detected* [PASS] in individuals with *cystic*_JJ fibrosis, *followed* [PASTP] by *healthy*_JJ individuals. (Cruickshank et al., 2022, RA Corpus)

> Seventeen of the respondents (5.3%) **indicated** [PRIV] **that**_THVC waterpipe smoking **is**_VPRT [BEMA] **more**_EMPH addictive than cigarette smoking, however, 206 respondents (64.6%) **indicated** [PRIV] **that**_THVC cigarette smoking **is**_VPRT [BEMA] **more**_EMPH addictive. Lastly, 96 respondents **reported** [PUBV] **that**_THVC a water pipe smoking and cigarette smoking

are_VPRT [BEMA] both equally *addictive*_JJ (**See** [PRIV] Figure 2) (Alqahtani, 2017, Thesis Corpus)

A notable positive Dimension 1 feature that student writers overused was the necessity modal *should* in recommendations (for research or practice), in suggestions such as "the need for an *international*_JJ element in RT education **should**_NEMD *be taken* [PASS] into consideration" (AbuNurah, 2016, Thesis Corpus), "therapists and parents who provided *inhaled*_JJ therapy and *supplemental*_JJ oxygen to children with CLD who **have**_VPRT tracheostomy **should**_NEMD *be advised and trained* [PASS] of administering *such*_JJ therapy before discharge from a hospital," (Ahmad, 2010, Thesis Corpus), and "*Electronic*_JJ cigarettes use among *young*_JJ adults **is**_VPRT [BEMA] a *public*_JJ health concern and **should**_NEMD *be studied* [PASS] among *different*_JJ populations" (Alanzi, 2016, Thesis Corpus). This trend included recommendations that students cited from previous literature. As noted in the move analysis results (chapter 4), to build an argument that the topic of the paper is worth studying, published authors often implied the importance by discussing the scope of a problem without needing to explicitly mention that it "should" be investigated. For recommendations for practice, published authors used strategies like describing the benefits of the recommended approaches (e.g., "new pulmonary artery anti-remodelling agents could be of potential benefit to ameliorate the progression of disease"). Recommendations for future research in the RA corpus included "could" (a possibility modal) and other varied forms (e.g., "further randomized control trials…are needed" [Seiler et al., 2022]; "longitudinal studies are warranted" [Namgung et al., 2022]).

Similar wordy/concise dichotomies have appeared in other MDA studies, with some overlapping features. Friginal and Weigle's (2014) "Simplified vs. Elaborated Description"

Dimension included evaluative adjectives on the simplified pole (similar to the attributive adjectives on the concise side of Dimension 1) and *that* verb complement clauses on the wordier pole (which also appeared on the wordy pole of Dimension 1). Biber's (1988) "Online Elaboration" dimension, characterizing text with lengthy elaboration produced without planning time, also include *that* verb complement clauses.

The findings on how expert writers in respiratory therapy form descriptions align with Biber and Gray's (2010) findings that academic writing, particularly in research articles, tends to have more "compressed" concise structures than lengthier "elaborated" structures. Examples of compressed structures that they provide include phrasal modifiers (a category into which attributive adjectives would fall), and nonfinite clauses (a category into which past participial clauses would fall). Concision with passive voice for describing procedures has also been noted in medical research articles (Biber & Finegan, 2001) and research articles with quantitative methods (Gray, 2013), and many of the texts in both corpora reported on quantitative research. The significantly lower use of these features in the thesis corpus suggests that students had not yet reached the level of compression that is expected in academic writing in their field. Respiratory therapy instructors' impressions of students' verbosity will be discussed in chapter 5.

3.4 Dimension 2: Descriptive Cohesion vs. Basic Linking

In the second factor, there were 10 features with strong positive loadings and one feature with a strong negative loading, displayed in Table 7 above. Positive features were predicative adjectives, *be* as a main verb, analytic negation, causative adverbial subordinators, demonstrative pronouns, pied-piping relative clauses, conditionals, concessive adverbial subordinators, downtoners, and adverbs, and the only negative feature was phrasal coordination. The RA Corpus had a positive average Factor 2 score (0.32), whereas the Thesis Corpus had a negative

average Factor 2 score (-1.16). Dimension 2 was named “Descriptive Cohesion vs. Basic Linking.”

Figure 3 Dimension 2 Scores

Positive Dimension 2 Features

Features with strong positive loadings in Dimension 2 played descriptive and cohesive roles. For example, the positive features described probabilities, quantities, participants, healthcare procedures, cause/effect relationships, conditions, and contrasts with connecting words (*because*, concessive adverbial subordinators, etc.). The strongest positive Dimension 2 feature was predicative adjectives, which are used for description (Biber, 1988; Biber et al., 2021). Common predicative adjectives in the RA corpus included *likely*, *higher*, *similar*, *available,* and *able.* Their collocations from the left included *be* as a main verb (also a Dimension 2 feature), which linked the subjects to their corresponding predicative adjectives. Other collocates from the left with strong loadings on Dimension 2 included adverbs, adding more description, and analytic negation (for negative descriptions). A common adverb appearing

before predicative adjectives was *significantly* (e.g., *significantly higher/lower/different*), as many papers described statistically significant findings. An example of adverb use in the RA corpus is displayed below:

> It may **also_RB** permit early identification of trend in a patient's degree of respiratory support that may be represented more **subtly_RB** in individual variables. The RSS may **also_RB** identify **when_RB** a patient's ventilator weaning trajectory has stalled, which may prompt clinical reevaluation. (Sinha et al., 2020, RA Corpus)

Downtoners contribute to description by lessening the degree of the modification. The most common downtoners in the RA corpus were *only*, *slightly*, and *almost*. They commonly followed negators and *be* as a main verb, and they were commonly followed by numbers, nouns, and predicative adjectives. Pied-piping relative clauses (preposition + relative clause) also provide descriptive information. Biber (1988) describes pied-piping relative clauses contributing to explicit elaboration. As they connect noun phrases to postmodifying clauses, they could be seen as both descriptive and cohesive devices, as seen in the example below. In the RA corpus, both *which* and *whom* were common relativizers in pied-piping clauses.

> The diagnostic methods are **commonly**_RB divided into: (a) nucleic acid-based assays, **in which** [PIRE] RNA of the virus causing COVID-19, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is amplified; and (b) serological assays, **in which** [PIRE] antibodies/antigens specific to SARS-CoV-2 are targeted. (Quraishi et al., 2023, RA Corpus)

Other Dimension 2 features contributed to cohesion. Demonstrative pronouns, which have cohesive functions in academic writing (Gray, 2010), loaded strongly on this dimension. They connect ideas across sentences by referring to previously mentioned ideas (replaced by the

demonstrative pronoun). Other cohesive features, causative adverbial subordinators (*because*), conditional adverbial subordinators, and concessive adverbial subordinators, specified the connections between ideas. These features are comparable to the logical connectors in Gray's (2013) Dimension 1. Causative adverbial subordinators noted cause/effect relationships, conditional adverbial subordinators (most frequently *if*) noted conditional relationships, and concessive adverbial subordinators noted contrast. In many cases adverbs also contributed to cohesion by connecting ideas—some of the most commonly used adverbs in the RA corpus included *also*, *when*, *respectively*, *as*, and *then*. Concessive adverbials and downtoners can also be used in academic writing to make claims less bold (Biber, 1988), allowing authors to have control over the boldness of their descriptions.

The excerpt below demonstrates the descriptive and cohesive functions of the positive Dimension 2 features. The adverbs and predicative adjectives provide description (in one case facilitated by be as a main verb), the demonstrative pronoun contributes to cohesion by referencing the idea in the previous sentence, and the pied-piping relative clause plays a cohesive and descriptive role by connecting "ICU environment" to its description.

> However, the score can be **easily**_RB customized for different environments by applying different weightings or **even**_RB different variables within a similar construct (eg, more **heavily**_RB weighting peak inspiratory pressure, PEEP, and F_{IO2} in the ARDS setting). The score facilitates visualization of changes in RST, such as pressure support (or spontaneous breathing) trials, including the number *and*_PHC duration of those trials. **This**_DEMP may **be** [BEMA] **useful**_PRED to communicate such information in the ICU environment, in **which** [PIRE] providers change **regularly**_RB. (Sinha et al., 2020, RA Corpus).

Negative Dimension 2 Features

Only one feature, phrasal coordination (with *and*), had a strong negative loading on Dimension 2. The function of phrasal coordination is to form connections between phrases. The thesis corpus had a negative average Dimension 2 score, and the most common categories of words connected by phrasal coordination were nouns, nominalizations, attributive adjectives (such as *safe and effective*), and gerunds. The noun *knowledge* was particularly common with phrasal coordination, as many theses assessed respiratory therapists' knowledge of important concepts (see chapter 5 for a professor's impression of this trend). The following excerpt illustrates the use of phrasal coordination: "E-learning or online learning can be defined as the use of electronic techniques **and**_PHC media to provide support and enhance both learning **and**_PHC education involving communication between learners **and**_PHC teachers using online content" (Alshehri, 2023, Thesis Corpus). In this example, the student used phrasal coordination to link items in pairs of ideas. The use of phrasal coordination allowed the author to give detailed information in the definition of e-learning.

Dimension 2: Significant Differences in Dimension Scores- Expert and Student Texts

There was a moderately significant difference in the Dimension 2 scores Welch's $t(215) = 9.47$, $p = .002$. Comparing the normed frequencies of each Dimension 2 feature in the student and expert corpus, there was a significant difference in the use of *be* as a main verb, analytic negation, causative adverbial subordinators, pied-piping relative clauses, concessive adverbial subordinators, and phrasal coordination. Out of these features, analytic negation, causative adverbial subordinators, pied-piping relative clauses, and concessive adverbial subordinators were used more in the RA corpus (which had a positive Dimension 2 score), but *be* as a main verb was used more in the thesis corpus. The negative Dimension 2 feature, phrasal coordination,

was used significantly more in the thesis corpus (which had a negative Dimension 2 score). Based on these findings, the differences in analytic negation, causative adverbial subordinators, pied-piping relative clauses, concessive adverbial subordinators (positive features), and phrasal coordination (negative feature) seem to be key contributors to the difference in the Dimension 2 scores. Tables 10 and 11 provide the Welch's *t* value and *p* value for each of the Dimension 2 features.

Table 10 Welch test results: Features with strong positive loadings on Dimension 2 in the student and expert corpus

	Welch's *t*	Degrees of freedom	Significance
Predicative adjectives	0.52	175.81	0.470
Be as a main verb	22.59	183.85	0.000
Analytic negation	11.53	163.97	0.001
Causative adverbial subordinators	13.96	259.98	0.000
Demonstrative pronouns	.748	201.12	0.388
Pied-piping relative clauses	25.73	275.26	0.000
Conditionals	2.98	146.53	0.086
Concessive adverbial subordinators	62.79	323.03	0.000
Downtoners	0.09	172.90	0.768
Adverbs	2.21	157.96	0.139

Table 11 Welch test results: Features with strong negative loadings on Dimension 2 in the student and expert corpus

	Welch's *t*	Degrees of freedom	Significance
Phrasal coordination	4.10	146.71	0.045

Dimension 1 provides a picture of how student and experts' written descriptions differ, and Dimension 2 offers more insight into how both groups' descriptions diverged. Expert writers (positive Dimension 2 score) utilized more sophisticated connectors indicating the relationships between connected ideas or adding other types of description, whereas master's students (negative Dimension 2 score) heavily relied on a more simplistic phrasal connector, *and*. The

expert writers utilized causative adverbial subordinators, pied-piping relative clauses, and concessive adverbial subordinators more than student writes to build cohesive descriptions of their studies. The quote below illustrates how an expert writer formed descriptive cohesion using Dimension 2 features.

> **Although**_CONC suboptimal, the proportion referred in our study **was** [BEMA] **considerably**_RB **higher**_PRED than what is reported in earlier work. **That**_DEMP is, a recent study completed in the United Kingdom reported 16% of people with COPD were referred to a PRPSNNP. However, **because**_CAUS this earlier study did **not**_XX0 restrict the analyses to people who were deemed suitable for a PRPSNNP, these figures do **not**_XX0 reflect the magnitude of the implementation gap. **That**_DEMP is, it **is** [BEMA] **impossible**_PRED to distinguish missed referrals (which **is** [BEMA] the implementation gap) from appropriate nonreferrals (which **is** [BEMA] an appropriate outcome) Without first considering someone's suitability for a PRPSNNP. In contrast, we considered first whether someone **was** [BEMA] **suitable**_PRED for referral to a PRPSNNP before classifying them according to whether they were referred… **Notably**_RB, the **only**_DWNT variable that differed between the participants classified as appropriate referrals and missed referrals **was** [BEMA] their interest in the program (Hug et al., 2022, RA Corpus)

Taking into account the Dimension 1 results indicating that student writers used other adverbial subordinators (not causative, concessive, or conditional) more than expert writers and the Dimension 2 results that students used causative adverbial subordinators, pied-piping relative clauses, and concessive adverbial subordinators less than expert writers, it can be concluded that the two groups are forming cohesion differently. Students' use of other adverbial subordinators

and phrasal coordinators may indicate an awareness of the need for connectors before noticing which connectors are more prominent in their discipline. Previous literature on which cohesion devices are associated with positive impressions from readers has had conflicting results, and it has been speculated that different writing tasks may call for different cohesion devices (Crossley et al., 2016a). However, in the absence of studies on which connective devices are favored in reports of respiratory therapy research, it can be hypothesized that the cohesive devices that are frequent in published journal articles may be helpful for students to learn.

3.5 Dimension 3: Discussing Academic and Discipline-Specific Topics and Processes

Factor 3 contained features used for discussing academic and discipline-specific topics. The features with strong positive loadings on this factor were average word length, nominalizations, gerunds, infinitives, and suasive verbs. As displayed in Figure 4, the thesis corpus had a positive average Factor 3 score (1.37), and the RA Corpus had a negative average Factor 3 score (-0.37). Only one feature, agentless passives, had a strong negative loading on Factor 3. Dimension 3 was named “Discussing Academic and Discipline-Specific Topics and Processes.”

Figure 4 Dimension 3 Scores

Positive Dimension 3 Features

The positive features reflect the academic topics discussed in the texts. Biber (1988) describes high word length as being indicative of information density because longer words tend to have more specific meanings than shorter words. Many of the nominalizations and other long words in the thesis corpus included academic and discipline-specific vocabulary. Common nominalizations in the thesis corpus were *education*, *ventilation*, *questions*, *perceptions*, *simulation*, *management*, and *treatment*. Nominalizations were commonly preceded by adjectives (like *mechanical ventilation*), determiners, prepositions, the word *research* (*research questions*), or possessives in the thesis corpus. Gray (2013) describes nominalizations as making nominal forms out of actions, since they are derived from verbs. Gerunds are similar to nominalizations in that they can be used to derive a noun from a verb root, sometimes for verbs that do not have a nominalization option (e.g., *learning*), and sometimes for verbs do have a nominalization option with a slightly different meaning or use (e.g., *acting* and *action*). The most common gerunds in the thesis reflected common topics in academic and respiratory therapy-

specific writing: *finding(s)*, *smoking*, *nursing*, *learning*, *teaching*, *training*, *breathing*, *setting(s)* (*ventilator settings*, *clinical settings*, *educational settings*), and *understanding*. They were commonly preceded by adjectives, nouns (e.g., *waterpipe smoking*), and determiners and/or followed by nouns, *and*, *of*, and *students*.

Infinitives have been described as contributing to an involved discoursal style (Biber, 1988; Hardy, 2014). The most common infinitives in the thesis corpus were *be*, *determine* (also a suasive verb), *evaluate*, *assess*, *provide*, *improve*, and *measure*, which are common in academic writing in general (Gardener & Davies, 2014). Suasive verbs in the thesis corpus included reporting verbs and verbs relating to human decisions, for functions such as citing previous research, describing methods, reporting findings, stating implications, and sharing recommendations. In line with the other Dimension 3 features, the commonly used suasive verbs were generally academic vocabulary (Gardener & Davies, 2014). In sum, the positive end of Dimension 3 can be interpreted as academic and discipline-specific terminology, with some active processes provided by the commonly used infinitives. The excerpt below demonstrates this trend:

> Unlike the traditional classroom **setting**_GER, the use of **simulation**_NOMZ in health care **education**_NOMZ combines both a hands-on approach and the **manipulation**_NOMZ of apparatus **allowing** [SUAV] students the **opportunity**_NOMZ **to**_TO apply their critical **thinking**_GER. In a **simulation**_NOMZ lab, students *are presented* [PASS] with a **situation**_NOMZ **to**_TO work out that is similar to what they would encounter in a real clinical **environment**_NOMZ after which they receive feedback on their performance. (Alqarni, 2015, Thesis Corpus)

Negative Dimension 3 Features

On the negative pole of Dimension 3, agentless passives were the only feature with a strong loading. Agentless passives can be used to describe processes or actions without mentioning who or what did them. This can be done when the agent is not known, the agent is not relevant, the author is placing emphasis on the verb rather than the agent, the action is generally done by many individuals or everyone, or the author wanted to create sentence variety by avoiding repeatedly starting the sentence with the agent. In the RA corpus, the unmentioned agents included avoided self-mentions (describing methods) as well as avoided mentions of cited authors, perhaps as a reader-friendly way to make the information about previous findings flow smoothly. The following excerpt exemplifies avoidance of self -mention:

> Particles **were quantified** [PASS] and divided into eight size bins ranging from 0.41 to 4.55 μm in diameter. Number of particles (count, n) and total accumulated mass (ng) were measured **[PASS]**. PFR was described **[PASS]** as particles per liter of exhaled air. Particles were collected **[PASS]** onto a membrane (Millipores LCR membrane, Merck KGaA, Darmstadt, Germany) for biochemical analysis. (Andreasson et al., 2022, RA Corpus)

In contrast, the excerpt below illustrated how agentless passive voice allowed the progression of cited findings (with citations removed) to build the reader's knowledge of the topic without excessive interruptions from mentions of the agents who conducted the cited studies:

> *Smoking*_GER **is thought** [PASS] *to*_TO **be involved** [PASS] in disease pathogenesis. The histopathologic changes **are thought** [PASS] *to*_TO result from Langerhans cells and langerin-containing dendritic cells. In contrast to LAM, *mutations*_NOMZ in several genes have **been identified** [PASS] in PLCH, including BRAF, NRAS, and MAP2K1.

> Of note, the oncogenic *mutation*_NOMZ BRAF-V600E has **been identified** [PASS] in patients with PLCH, consistent with the conclusion that PLCH is a neoplastic disease. As is the case in LAM, circulating cells and cell-free DNA have **been identified** [PASS] with characteristic *mutations*_NOMZ. In PLCH, FACS-isolated, CD1a-positive cell *fraction*_NOMZ **was found** [PASS] *to*_TO have a BRAF-V600E *mutation*_NOMZ. In some instances, the *mutations*_NOMZ have **been identified** [PASS] in isolated lung tissues. (Elia et al., 2022, RA Corpus)

In this example, the progression of findings flows smoothly with the omitted agents. The purpose of the text in this excerpt is to build the reader's background knowledge to understand the study that is later described. With the agentless passive, the focus is on the information rather than the researchers who discovered the findings that are mentioned.

Dimension 3: Significant Differences in Dimension Scores- Expert and Student Texts

There was a significant difference in the Dimension 3 scores of the thesis corpus and the RA corpus, Welch's $t(140) = 16.15$, $p < .001$. The Thesis Corpus had a positive Dimension 3 score, while the RA corpus had a negative Dimension 3 score. Tables 12 and 13 display the results of the Welch test determining which Dimension 3 features occurred at statistically significantly different frequencies in the RA and Thesis corpus. The positive Dimension 3 features that occurred in each corpus at significantly different rates were gerunds, infinitives, and suasive verbs, all of which were more frequent in the Thesis Corpus. Agentless passive voice, the only negative Dimension 3 feature, also occurred at significantly different rates in the two corpora, with more occurrences in the RA corpus (also described above in the Dimension 1 section).

Table 12 Welch test results: Features with strong positive loadings on Dimension 3 in the student and expert corpus

	Welch's *t*	Degrees of freedom	Significance
Average word length	0.620	131.277	0.432
Nominalizations	2.256	149.118	0.135
Gerunds	6.274	121.212	0.014
To infinitives	26.177	214.399	0.000
Suasive verbs	5.583	128.866	0.020

Table 13 Welch test results: Features with strong negative loadings on Dimension 3 in the student and expert corpus

	Welch's *t*	Degrees of freedom	Significance
Agentless passives	28.90	165.10	0.000

From this information, it can be concluded that appropriately utilizing agentless passive voice more may help students write more like published authors. In many cases, students utilized active voice in grammatically correct ways in places where passive voice may have been more common in expert writing. The following excerpt illustrates an example of a missed opportunity to use agentless passives: "In **this**_DEMO study, the researcher evaluated **using**_GER **simulation**_NOMZ in a respiratory therapy program as a mandatory **requirement**_NOMZ prior to the clinical practice course" (Alhaykan, 2015, Thesis Corpus). In this example, active voice with "the researcher" referring to the author is not incorrect, but it reflects a much less frequent pattern in the RA Corpus. While passive voice places readers' focus on actions or processes in the RA Corpus, students' overuse of gerunds and infinitives, with the nominalizations that commonly appear with them, may be contributing to an action-focused style in the Thesis Corpus. In this regard, the two poles of Dimension 3 may be achieving similar functions with different features. However, infinitives and suasive verbs (positive Dimension 3 features) have

also been associated with overt persuasion (Biber, 1988), and they were found to be infrequent in medical texts in general (Atkinson, 1992). It can be concluded that utilizing agentless passive could be a way to place focus on processes and procedures that aligns more with the trends of the respiratory therapy discipline.

3.6 Dimension 4: Cautious Author Involvement

Factor 4 consisted of five features with strong positive loadings: split auxiliaries, adverbs, type-token ratio, possibility modals, and first person pronouns. On the negative pole, there were no features with loadings of -0.30 or less. The RA Corpus had a Factor 4 score of 0.37, and the Thesis Corpus had a Factor 4 score of -1.38. The factor scores are displayed below in Figure 5. Dimension 4 was named "Cautious author involvement" because of the functions of the features with strong loadings.

Figure 5 Dimension 4 Scores

In the RA corpus, which had a positive average dimension score, the split auxiliaries included adverbs for both descriptive and connective functions (like "also"). The most commonly used adverbs in the split auxiliaries were *also*, *significantly*, *then*, *previously*, and

only. The most commonly used adverbs in general in the RA corpus, whether in split auxiliaries or other contexts, were *also*, *when*, *significantly*, and *well*, and adverbs commonly appeared before the words *significant* (*statistically significant*), *higher*, *to*, and *used*. Some notable functions of adverbs in the RA corpus were used for providing information about time (also noted by Biber et al., 2021) or using time-related words to link ideas cohesively (such as in a sequence of steps in the methods), statistics ("statistically significant"), adding information (*also*, *as well as*; referred to by Biber et al., 2021 as "additive" degree adverbs), forming generalizations (*often*, *currently*, *generally*, *commonly*). Some adverbs can also be used to indicate the author's stance (Gray & Biber, 2012), and adverbs displaying epistemic stance, such as *possibly* and *probably*, were notable in the RA corpus as well. An example of an adverb in a split auxiliary displaying epistemic stance is provided in the following example: "This innovation could_POMD [SPAU] potentially_RB be lifesaving in a resource-limited or crisis setting" (Sojar et al., 2021, RA Corpus). In this example, the adverb is hedging the authors' claim. The sentence could have the same meaning without *potentially*, but using the word *potentially* makes the authors' stance very clear.

Dimension 4 also incorporates careful wording. Type-token ratio is a measure of lexical diversity (Durant et al., 2021), and high type-token ratio in academic writing can be a sign of intentional word choice, as it is more common in planned discourse than in spontaneous speech (Biber, 1988). The lexical diversity in the RA corpus was notable in the spit auxiliaries; many different adverbs appeared between auxiliary verbs and main verbs. The careful wording in texts with high Dimension 4 scores aligns with the high number of carefully hedged claims.

Possibility modals were used in the RA corpus for expressing both possibility and uncertainty, and more specifically, for limiting a scope, hedging, and offering speculations.

Some of these uses fall under Biber's (1988) description of possibility modals used to make claims less bold in academic writing. They commonly appeared before *be* (more than a third were in passive voice), adverbs causing split auxiliaries, and *not*. As seen in the example above, possibility modals like *could* allowed authors to provide opinions that were not proven.

First person pronouns allow authors to share their voice or their role in the research process. Although passive voice can be used instead of first person pronouns in many cases, in the RA corpus, both passive voice and active voice with first person subjects were used within the same paragraphs; both were prominent. Previous research on first person pronouns in academic writing has found that first person pronoun use seems to be idiosyncratic; some authors use first person pronouns in multiple texts while others never use them (Dixon, 2021). However, in the RA corpus, the majority of the texts contained first person pronouns, indicating that it may be more of an accepted norm than an idiosyncratic style in the field of respiratory therapy.

Based on the observed uses of Dimension 4 features for epistemic stance and mentioning oneself in the description of research, the dimension was named "Cautious author involvement." The authors acknowledged their active role in the research process and interpretation of the findings, offered beliefs and speculations, and made claims using Dimension 4 features, but they did so with degree adverbs (Biber et al., 2021), possibility modals showing an uncertain stance, explicit markers of generalization when generalizations were formed, and references to statistics. Below is an example of how authors made caution claims using Dimension 4 features:

> It **may**_POMD [SPAU] **also**_RB permit early identification of trends in a patient's degree of respiratory support that **may**_POMD be represented more **subtly**_RB in individual variables. The RSS **may**_POMD [SPAU] **also**_RB identify **when**_RB a

> patient's ventilator weaning trajectory has stalled, which **may**_POMD prompt clinical reevaluation. (Sinha et al., 2020, RA Corpus)

In contrast, the following excerpt uses the Dimension 4 features to convey a confident stance, with possibility modal "could" used as the past tense of "can" (indicating ability not hedging):

> **Our**_FPP1 main findings were: (1) All versions of COMPERA 2.0 4-S model outperformed the 3-S one in discriminating the differences in echocardiographic and hemodynamic parameters, and clinical worsening-free survival rates; (2) both the original and hybrid COMPERA 2.0 prediction models **could**_POMD predict clinical outcome, and the hybrid version tended to perform **better**_RB; (3) the first BPA session **could**_POMD [SPAU] **significantly**_RB improve the risk profiles; (4) risk stratification within 7 days after the first BPA session **could**_POMD [SPAU] **also**_RB predict clinical worsening events; (5) the proportion of patients achieving low or intermediate-low risk profiles increased **proportionally**_RB to the increment of BPA sessions; (6) in patients with intermediate-high or high risk at baseline of the original and hybrid 4-S versions, those who were improved to intermediate-low or low risk after the first BPA session had better clinical outcome than those who remained intermediate-high or high risk; (7) the number of BPA sessions required to achieve low risk mPAP < 30 mmHg increased as the baseline risk score was higher; (8) low-risk profile was a more **easily**_RB reachable endpoint than hemodynamic normalization. (Zhang et al., 2022, RA Corpus)

These two examples illustrate how the Dimension 4 features allow authors to make claims with varying levels of boldness. This ability to convey stance, along with self-mentions through first person pronouns, contributes to making the authors' voices apparent.

Dimension 4: Significant Differences in Dimension Scores- Expert and Student Texts

There was a significant difference in the Dimension 4 scores of the thesis corpus and the RA corpus, Welch's $t(189) = 37.98$, $p < .001$. The average normalized frequency of every Dimension 4 feature was higher in the RA Corpus than the Thesis Corpus, and this difference was significant for split auxiliaries, possibility modals, and first person pronouns. Table 14 displays the results of the Welch test for significant differences in the frequency of each Dimension 4 feature.

Table 14 Welch test results: Features with strong positive loadings on Dimension 4 in the student and expert corpus

	Welch's *t*	Degrees of freedom	Significance
Split auxiliaries	6.464	225.407	0.012
Adverbs	2.215	157.960	0.139
Type-token ratio	2.748	182.833	0.099
Possibility modals	6.605	168.906	0.011
First person pronouns	142.886	290.245	0.000

The difference between student and expert writers' use of Dimension 4 features suggests that expert writers express their voice differently from student writers. In particular, student writers had much fewer self-mentions through first person pronouns. In the RA corpus, "we" was much more common than "I," and it is possible that student writers noticed this pattern. Theses are single-authored, so "we" would be less likely to fit. There were some cases of "we" referring to the author of single-authored theses with no mention of a research team, perhaps because students noticed the norms of writing methods sections without considering the plural meaning of "we," or perhaps because a collective "we" is more comfortable to use than an individual "I." Other studies on academic writing have found possible cultural variation in the inclusion of stance, personal pronouns, and hedged claims about the findings (Friginal & Mustafa, 2017),

which could also be a factor in the differences observed. The difference in the use of possibility modals and split auxiliaries may indicate that students could utilize these features more to control the level of certainty in their claims. In the following example, a student author conveyed the findings of the study without using Dimension 4 features: "Thus, simulation has been proven to be advantageous in cases involving both academic and clinical settings" (Alqarni, 2015, Thesis Corpus). This example could come across as bold because of the verb *prove.* If it were reworded to include possibility modals ("Thus, simulation **can** be advantageous in cases involving both academic and clinical settings"), a split auxiliary ("Thus, simulation **can potentially** be advantageous in cases involving both academic and clinical settings"), or another adverb ("Thus, simulation is **potentially** advantageous in cases involving both academic and clinical settings"), the boldness could be softened. By learning to combine Dimension 4 features, students would be able to display their voice in an academic way with control over the epistemic stance.

In sum, the results of the MDA may be reflective of students' partial acquisition of academic style. The theses contained many features associated with academic writing, and the texts were more similar to RAs than other genres described in previous literature. However, there were still many significant differences between student and expert writing, indicating that students had not yet fully adopted the writing conventions of their field. Completing a master's program may be the beginning of students' research journey, and as they progress in their fields, they may continue to acquire the norms of their discourse community. Although some of the differences between student and expert writing that were identified could be expected without empirical data, the results of the MDA provide concrete details about which features students can use to write concise descriptions, link ideas descriptively, place emphasis on actions or processes, insert authorial presence into their writing, and hedge their claims. Rather than simply

telling students to write concisely, for example, EAP teachers can show students specific features that are used to write concise descriptions. With the details about specific linguistic features that expert writers use more frequently than student writers, students can have a clear idea of how to improve their academic styles.

4 RESULTS & DISCUSSION FOR RESEARCH QUESTION 1: WHAT ARE THE DISTINCTIVE RHETORICAL AND LINGUISTIC CHARACTERISTICS OF PUBLISHED RESPIRATORY THERAPY RESEARCH ARTICLES, AND HOW DO LINGUISTIC FEATURES IN PUBLISHED RESEARCH ARTICLES AND MASTER'S THESES COMPARE? PART 2: MOVE ANALYSIS RESULTS

Organization is a common writing challenge for respiratory therapy graduate students (see chapter 5). To provide EAP teachers with an organizational scheme specific to respiratory therapy RAs, the structure of a subset of texts from the RA corpus was examined. Using Swales's (1990) move analysis approach, the moves and steps of 52 articles in the RA Corpus were identified, starting by adapting Nwogu's (1997) framework. The majority of the articles in the corpus contained an introduction, methods, results, discussion, and conclusion sections. Most articles did not contain a separated literature review.

4.1 Moves and Steps in Introduction Sections

Introduction sections in the corpus are notably brief. The moves and steps identified in introduction sections are listed in Table 15. Most articles started with very general information, followed by more specific research findings. These two steps tended to cycle throughout a paragraph or two; general statements were used to introduce new (but related) topics, and specific information about the topics followed the general statements. The cited information had two primary functions: giving readers important background information and building justification for the need for a study. Optional (occurring in fewer than 29% of texts; Hüttner, 2010) and "ambiguous" (occurring in 30-49% of texts; Hüttner, 2010) steps interwoven between the general and specific cited information were defining terms, which contributed to building background information, and citing statistics about the prevalence of a problem, which

contributed to building justification for the need for a study. Some papers opened with a definition in the first sentence. In these cases and in cases that use definitions to introduce a new topic, the definitions appear to be included more for the purpose of introducing a topic than informing the reader. For example, some papers include basic definitions of asthma in the first sentence of the introduction or a new paragraph of the introduction section, even though readers of the journals included in the corpus are likely to already be familiar with the definitions provided.

Table 15 Moves and Steps in Introduction Sections

Move	**Texts containing each Move**	**Steps**	**Texts containing each step**
General openers	50 (96%)	Reference to general established knowledge	47 (90%)
		Definitions	24 (46%)
Referencing specific findings	51 (98%)	Statistics about prevalence	20 (38%)
Indicating the need for the study	51 (98%)	Reference to limitations of previous research or need for research	41 (79%)
		Limitation or problem in treatment or current practice	35 (67%)
		Reference to potential implications	21 (40%)
Announcing the present study	50 (96%)	Reference to research purpose	48 (92%)
		Reference to main research procedure	12 (23%)
		Hypothesis	12 (23%)

Note: Under Hüttner's (2010) classification, moves occurring in 90-100% of texts are considered obligatory, 50-89% of texts are considered "core," 30-49% of texts are considered "ambiguous," and 1-29% of texts are considered optional.

After briefly reviewing previous research for about one to three paragraphs, the need for a new study was provided by mentioning gaps or limitations in the literature, practical problems, or limitations in current treatment or practice. Although these steps often appeared directly after

the brief review of previous literature, they were also commonly interspersed throughout the cited information in a general topic opener, specific information, limitation/gap cycle. The cycling aligns with Swales's (2011) observations of the cycling of the "establishing a niche" step. To further build the justification for the need for a study, many (21/52) introductions also alluded to the implications of the study, such as how more information about the topic researched could contribute to practice.

After the gaps or limitations were mentioned to justify the need for a study, very general information about the study was mentioned. The purpose of the study was mentioned in almost all of the articles analyzed (48/52). Some studies (12/52) also briefly alluded to the methods used. Implications could also be mentioned in this move. An example introduction (S. Kim et al., 2023) with labeled steps is provided below:

> ["The prevalence of nontuberculous mycobacteria (NTM) pulmonary disease (PD) has increased worldwide, and the disease burden associated with NTM PD is substantial.[1-5] NTM PD is known to be associated with many comorbidities.[6] The proper management of these comorbidities is important because they affect the clinical presentation and prognosis of patients with NTM PD and can be attributable to the development or progression of NTM PD.[7]"] ***Reference to general established knowledge*** ["Gastroesophageal reflux disease (GERD) is a common comorbidity of NTM PD.[6,8,9]"] ***Referencing specific findings*** ["In previous studies, up to 45% of patients with NTM PD were shown to have GERD, which is associated with more symptoms and severe disease in this population.[8,9]"] ***Statistic about prevalence*** ["Although the association between GERD and NTM PD has been relatively well studied in terms of symptoms and disease presentation,[8,9] whether GERD predisposes a patient to NTM PD developing and, if so,

which factors are associated with the development of NTM PD in patients with GERD, remains unknown."] ***Limitation in previous research*** ["Because identifying modifiable risk factors is an important strategy to reduce the disease burden of NTM PD, solving these issues may be clinically relevant and important."] ***Potential implications*** ["In the present study, the effects of GERD on the development of NTM PD were evaluated and factors associated with increased risk of NTM PD were elucidated in patients with GERD. In addition, the association between the development of NTM PD and health-care use was evaluated in patients with GERD."] ***Reference to research purpose*** (S. Kim et al., 2023)

In this example, the authors introduced previous research on the topic, built the argument for a need for the study, and introduced the purpose of their study. In Table 16 below, an example of each step in the introduction moves is provided.

Table 16 Examples of Steps in Introduction Sections

Move	**Steps**	**Example**
General openers	Reference to general established knowledge	"Worldwide, asthma is believed to be underdiagnosed and undertreated.[3]" (Cavallazzi et al., 2020)
	Definitions	"Among the respiratory impairments, arterial hypoxemia is defined as low levels of oxygenation on arterial blood, with PaO2 < 60 mm Hg or SpO2 < 90%.[3-7]" (Zopelari et al., 2023)
Referencing specific findings	Statistics about prevalence	"The incidence of PVA in the ICU has been reported to be anywhere from 25% to 100%.[3,7-10]" (Gardner et al., 2021)
Indicating the need for the study	Reference to limitations of previous research or need for research	"Evidence to inform suicide risk assessment for individuals with smoking exposure with and without COPD is limited." (Adviento et al., 2023)
	Limitation or problem in	"However, tracheostomy is associated with several complications and increased morbidity and mortality.[3]

	treatment or current practice	Tracheostomy patients have increased risks of malnutrition, nosocomial infections, pressure sores, and fistulas.[4] Furthermore, these patients place a significant burden on hospital resources and account for the highest levels of hospital reimbursement.[5,6]" (Alhashemi et al., 2022)
	Reference to potential implications	"By understanding the characteristics of these patients and the support structure that surrounds them, we hope to inform processes that may improve monitoring, prediction, and treatment of respiratory failure in this population." (Bedoya et al., 2020)
Announcing the present study	Reference to research purpose	"The purpose of this pilot study was to determine if there were any relationships between respiratory therapists' hiring practices and educational requirements and respiratory-related patient outcomes. The study also examined patient outcomes associated with RTs having an advanced degree, along with being a registered respiratory therapist." (Gresham-Anderson et al., 2020)
	Reference to main research procedure	"…and the Awareness construct of the Awareness, Desire, Knowledge, Abilities, and Reinforcement (ADKAR) framework model will be appropriate to assess the current perceptions and experiences of RTs in Singapore to determine if there is consensus based on their unique perspectives about their profession and their working experiences.[22]" (Lee et al., 2022)
	Hypothesis	"We hypothesized that patients discharged using the transition bundle would be more likely to visit their physician within 2 weeks of discharge." (Atwood et al., 2022)

4.2 Moves and Steps in Methods Sections

The methods were composed of three broad sections: describing the study and data, procedures, and statistical or qualitative analyses performed. Within these sections, considerable cycling and variation in the order of steps was observed in the steps. The moves and steps identified in the methods sections are displayed below in Table 17, and the number of texts containing each move and step is provided. An additional step, referencing a pilot study that informed the methods, could occur in any move, and it was seen in 10 out of 52 (19%) texts.

Table 17 Moves and Steps in Methods Sections

Move	**Texts containing each Move**	**Steps**	**Texts containing each step**
Describing the study and data	52 (100%)	Type of study (retrospective, prospective, longitudinal, qualitative case study, etc.)	36 (69%)
		Timeframe	32 (62%)
		Data source	44 (85%)
		Data inclusion criteria	38 (73%)
		Data size	28 (54%)
		Other data description	27 (52%)
		Ethics committee approval, reasons for not needing approval, or other information about research ethics	46 (88%)
Description of procedures	52 (100%)	Describing the intervention (if applicable)	11 (21%)
		(Purpose of measuring each variable)	42 (81%)
		Constructs measured, variables included, or samples or data collected	52 (100%)
		Stating what was compared	33 (63%)
		How variables were measured or data was collected:	52 (100%)
		Research, data collection, or care team description	35 (67%)
		Equipment, instruments, tests	36 (69%)
		Measurement classifications & thresholds or operationalization of complex or abstract constructs	37 (71%)
		Reference to another publication with more details about methods	19 (37%)
		Other descriptions of procedures	36 (69%)

		Assurance of good treatment of participants (interspersed as needed)	20 (38%)
		Conceptual explanations or explanations of common practices (interspersed as needed)	24 (46%)
		Justification of methodological choices (interspersed as needed)	19 (37%)
		Reference to visuals (methods or treatment flow charts, classification tables, photographs of equipment) (interspersed as needed)	23 (44%)
Statistical or qualitative analyses	51 (98%)	Stating the types of variables (continuous, categorical, etc.) and how they are expressed (means, etc.)	32 (62%)
		(Laying out the variables)	52 (100%)
		Stating what is compared	33 (63%)
		Listing variables excluded from analysis (if applicable)	8 (15%)
		Justification of sample size	12 (23%)
		Reiteration of the goal of the study (the reason for the statistical test)	42 (81%)
		Statistical tests	46 (88%)
		Significance cutoff values	35 (67%)
		Statistical or qualitative analysis software	48 (92%)

Note: Under Hüttner's (2010) classification, moves occurring in 90-100% of texts are considered obligatory, 50-89% of texts are considered "core," 30-49% of texts are considered "ambiguous," and 1-29% of texts are considered optional.

The description of the study and data move contained steps for indicating the type of study (retrospective, prospective, longitudinal, qualitative case study, etc.), often the first sentence of the methods section), the timeframe of data collection, the data source, data inclusion and exclusion criteria, data size, other relevant data description, and mention of approval from an ethics committee (or in some cases, justification for not needing ethics committee approval) or other information about ethics. Some texts included the step of providing justification of the sample size in this move, while others included this information in the statistical analysis section.

Table 18 Examples of Steps in the "Describing the Study and Data" Move

Steps	**Example**
Type of study (retrospective, prospective, longitudinal, qualitative case study, etc.)	"This prospective study…" (Adiyeke et al., 2020)
Timeframe	"…was conducted from July 2018 through January 2021 (with an interruption due to COVID-19 from March 2020-September 2020)" (Driver et al., 2023)
Data source	"Data from the National Health Insurance Service National Sample Cohort, which is a population-based retrospective cohort, including a 2.2% representative sample of Korean citizens, were used." (Kim et al., 2023)
Data inclusion criteria	"All consecutive patients admitted during the first pandemic wave between the 06th of March and the 30th of April 2020 for PCR confirmed COVID-19 ARDS [30] who were invasively ventilated and proned at least once during their ICU stay were considered for inclusion. Patients proned only during ECMO treatment, patients already proned in a referring hospital and patients who refused utilization of their clinical data were excluded." (Boffi et al., 2022)
Data size	"9 healthy subjects volunteered to participate in the study and were consented." (Li et al., 2022)
Other data description	"Participant characteristics including anthropometrics, body composition, lung function and respiratory muscle strength are given in Table 1." (Boyle et al., 2022)
Ethics committee approval, reasons for not needing approval, or other information about research ethics	"This retrospective cohort study was approved by the institutional review board of the King Abdullah International Medical Research Center. Due to the study's retrospective design, informed consent was not required." (Alhashemi et al., 2022)

In the procedures move, writers described what was done in the study. Studies testing interventions included a description of the intervention. Many studies had a form of a repetition of the purpose of the study in a sentence containing the goal of measuring, recording, or including the variables. Most studies had a description of what was measured, how it was measured, and why it was measured. Within the step of describing what was measured or

collected, the variables measured, recorded or included were mentioned, and if there were comparisons, the items compared could be explicitly stated in this step and/or later in the analysis move. The way that measurements were taken or the data was collected was specified. Sub-steps for this included descriptions of the research or care team collecting measurements and/or taking care of participants, equipment, instruments, or tests (in a few cases, tests also appeared in the discussion of inclusion/exclusion criteria in the first section of the methods), measurement classifications and thresholds, and for abstract constructs, operationalizations of the variables. "Core" and "ambiguous" (Hüttner, 2010) steps that appeared in the measurement procedures section included references to other publications with more details about the methods, other descriptions of procedures, assurance that participants were treated well throughout the duration of the study, explanations (what was done, information about illnesses and treatments, common healthcare practices), justification for methodological choices, and references to visuals such as photographs (papers using equipment that not all readers would be expected to use often contained photographs of the equipment) and diagrams (such as flowcharts of treatments of the possible patient outcomes). The order of steps was flexible, and this move could repeat itself for studies with multiple variables.

Table 19 Examples of Steps in the "Description of Procedures" Move

Steps	**Example**
Describing the intervention (if applicable)	"The 3 options for interventions were HME (Humid-Vent Mini, Teleflex), active HH (MR850, Fisher & Paykel), and no device (Fig. 1)." (Bernatzky et al., 2020)
Purpose of measuring each variable	"To determine if less invasive measures of diaphragm contraction would correlate with tidal volume (VT) and Pdi,…" (Boyle et al., 2022)
Constructs measured, variables included, or samples or data collected	"Confidence and knowledge in using ventilator waveform graphics to identify modes of ventilation and PVA were evaluated" (Brescia et al., 2022)

Stating what was compared	"Scores for COPD mortality rate, pneumonia mortality rate, postoperative respiratory failure, and pneumothorax due to medical treatment for the reporting period of 2014-2017 were compared based on hospital size." (Gresham Anderson et al., 2021)
How variables were measured or data was collected:	
Research, data collection, or care team description	"Local hospital implementation teams comprising respirologists, pulmonologists, or general internal medicine physicians; registered nurses; licensed practical nurses; respiratory therapists; clinical pharmacists; and other allied health providers implemented transition bundle elements and undertook data collection and reporting." (Atwood et al., 2022)
Equipment, instruments, tests	"Pre- and postbronchodilator (400 mcg salbutamol) spirometry and plethysmography were performed using a SensorMedics VmaxR (VIASYS Healthcare; Yorba Linda, CA) device on the first and third visits using techniques standardized by the ERS/ATS" (Eller et al., 2022)
Measurement classifications & thresholds or operationalization of complex or abstract constructs	"…expiratory and inspiratory DT were calculated by determining the maximum perpendicular distance between the pleural and peritoneal layers, measuring only the distance of the hypoechoic area…" (Yeung et al., 2023)
Reference to another publication with more details about methods	"The details of the training, derivation, and validation of the model have been reported in detail previously.[12-14]" (Weir et al., 2023)
Other descriptions of procedures	"…information collected from all interviews was summarized for the participants through member checking to ensure the main points were captured without any misinterpretation or misunderstanding by the interviewer." (Lee, 2022)
Assurance of good treatment of participants (interspersed as needed)	"During the balance assessment, a family member or a caregiver was asked to be close to the subject during test execution (the subject had to maintain the position for 30s), to ensure subject safety." (Zolpelari et al., 2023)
Conceptual explanations or explanations of common practices (interspersed as needed)	"Dried secretions may obstruct the tracheostomy tube and cause respiratory distress; therefore, air humidification is an essential component of care for tracheostomy patients." (Alhashemi et al., 2022)

Justification of methodological choices (interspersed as needed)	"An interpretive phenomenological approach was deemed appropriate for this study, as the primary aim was to obtain a greater understanding of caring for dying patients through the lived experiences of the students and high-fidelity simulation." (Fino & Case, 2022)
Reference to visuals (methods or treatment flow charts, classification tables, photographs of equipment) (interspersed as needed)	"The scheme of the experimental protocol is demonstrated in Fig. 2." (Peták et al., 2022)

The last section of the methods described statistical or qualitative analyses (frameworks for qualitative analysis, process for identifying themes, etc.). Near the beginning of this section, the statistical categorization of the variable (continuous, categorical, etc.) and how they were reported (e.g., means, medians) was stated. This often came in a _____ *was represented as* _____ sentence, such as "categorical variables were presented as numbers and percentages" (Adiyeke et al., 2020). This step was skipped in qualitative studies. There was also often an explicit reiteration of the variables included and items compared (when applicable), even though this information was usually also mentioned in the previous move. If any variables or data were excluded, this information is reported as well. The results of a power analysis informing the sample size or other justification for the sample size (e.g., saturation of qualitative themes) were also often found in this section. The purpose of the study was often restated and the statistical tests are mentioned, possibly in the same sentence ("Log-rank tests were used *to determine the differences in survival of subjects with different OSS scores at NIV initiation and hours per day of NIV Usage*" [Cazzoli et al., 2020]). Cutoff values for significance were specified (this step was skipped in qualitative papers). In qualitative studies, the qualitative analyses were described instead of statistical analyses, and this was coded under the analysis move without a statistical analysis or cutoff level for significance step. R or the statistical or qualitative analysis software

used was cited. Studies with multiple tests repeated steps as needed. In this move, multiple steps could be combined into one sentence, as seen in the following example that includes the variables, the statistical categorization of variables, and the statistical tests: "The baseline demographics, hemodynamics, and lung function among the four groups was compared using Cochran-Mantel-Haenszel test for categorical variables and the Wilcoxon (van Elteren) test for continuous variables" (Nathan et al., 2023). Table 20 below provides additional examples of each step.

Table 20 Examples of Steps in the "Statistical or Qualitative Analyses" Move

Steps	**Example**
Stating the types of variables (continuous, categorical, etc.) and how they are expressed (means, etc.)	"Categorical data are presented as counts with proportions" (Chandel et al., 2021)
(Laying out the variables)	"This final multivariable model included the following variables (time-varying where appropriate): age, sex, race, BMI, pack-years, current smoking status, airflow limitation (FEV_1% predicted), dyspnea (mMRC score ≥ 2), 6-min walk distance, supplemental oxygen use, and severe exacerbations in the past year." (Adviento et al., 2023)
Stating what is compared	"For post hoc analysis, we compared the diaphragmatic parameters (DTexp, DTins, DTF, and DE) of infants with moderate vs severe BPD" (Yeung et al., 2023)
Listing variables excluded from analysis (if applicable)	"The asthma screening question that addressed symptom improvement with asthma treatment was removed from the model due to a quasi-complete separation of data points and failure of the model to converge." (Cavallazzi et al., 2020)
Justification of sample size	"The minimum sample was determined to be 55 individuals by using repeated-measures analysis of variance and when considering an effect size of 0.2, significance level of .05, and test power of 0.95. This sample was increased to 70 individuals to compensate for a possible 25% dropout rate." (Zopelari et al., 2023)
Reiteration of the goal of the study (the reason for the statistical test)	"…to determine the correlation between profession/credential, prior training in mechanical ventilation and waveform interpretation, years of experience, hours of training in mechanical

	ventilation, and the ability to correctly identify PVA." (Gardner et al., 2021)
Statistical tests	"Differences were tested using one-way ANOVA test and Student Newman Keuls (SNK) post hoc test was applied. Categorical variables were compared using the Wilcoxon test." (Li et al., 2023)
Significance cutoff values	"A p value of less than 0.05 was considered statistically significant." (Al-Harthi et al., 2017)
Statistical or qualitative analysis software	"All analyses were conducted by using SAS 9.4 (SAS Institute, Cary, North Carolina) and R version 3.5.2 (R Foundation, Vienna, Austria)." (Bedoya et al., 2020)

4.3 Moves and Steps in Results Sections

Swales (2011) suspected that the methods and results sections would display the most disciplinary variation, and in this corpus, the results sections indeed diverged from patterns identified in previous studies in some of the steps. It was determined that the results sections of corpus texts deviated substantially from Nwogu's framework, and a new framework that fit the data better was derived. The moves and steps identified in results sections are displayed below in Table 21. The first move in the results was providing general information about the participants or sample. This often included the sample size. Descriptive statistics about the participants not directly addressing research questions could also be included, as well as any information about the participants or sample that could influence the results. This move could be as short as one sentence or as long as a full paragraph. General numerical information about participants was included even in qualitative studies (number of participants, average interview length, etc.). Within this move, many texts contained a step of referring to visuals (tables, figures) that had general information about the participants.

Table 21 Moves and Steps in Results Sections

Move	**Texts containing each Move**	**Steps**	**Texts containing each step**
General information about participants/sample	48 (92%)	Reference to visuals	30 (58%)
Results of measurements	50 (96%)	Describing what happened in the research process	33 (63%)
		Descriptive statistics, percentages, proportions	40 (77%)
		Reference to visuals (descriptive statistics, experimental process, data collected)	29 (56%)
Results of analysis	51 (98%)	Elaboration on the results (examples, explanations, post-hoc clarification, interpretation)	36 (69%)
		Reference to visuals	49 (94%)

Note: Under Hüttner's (2010) classification, moves occurring in 90-100% of texts are considered obligatory, 50-89% of texts are considered "core," 30-49% of texts are considered "ambiguous," and 1-29% of texts are considered optional.

The second move in the results sections was describing results of measurements (including qualitative observations). Sometimes, this included a step of describing what happened in the research process, which could be a brief repetition of information in the methods to remind the reader of a procedure in the experimental process before listing the result of that procedure. Papers containing this step did not necessarily remind the reader of every procedure in the research process; some procedures were assumed to be remembered. The second move also contained a step for reporting descriptive statistics, percentages, proportions, or raw numbers. If non-numerical information was collected to answer a research question, it was also reported in this step. Many texts contained reference to visuals (tables, figures, photographs) of the results reported (descriptive statistics, data collected) or the experimental process. Within this move, the steps could cycle, with a reminder of one procedure, descriptive statistics found from

that procedure, and reference to a visual before moving on to results from the next procedure. Two texts that only contained analytical results, fitting in the third result move category, skipped the second move.

The third move was reporting the results of the analysis. For studies that included this move, the results of inferential statistics, interview themes, analyses of images (e.g., of lungs), or other forms of analysis were described. In some cases, a brief reminder about the analytical procedures was included. A "core" step with brief elaboration on the results, such as examples, explanations, post-hoc clarification, or interpretation of the results was included in many papers. Papers with interview data, in particular, often included example quotes for each theme. Other papers had brief statements about the practical impact of a finding. Some authors saved all the elaboration for the discussion section. Many papers included a reference to a visual (table, figure, photograph) of the analysis results. Sometimes, a table with information from both descriptive and inferential statistics was referenced in the second and third move of the results. Cycling between the second and third move was also common. Some writers reported the descriptive statistics and analysis results of one procedure or some related procedures before moving on to reporting the descriptive statistics and analysis results of the next procedure. In some cases, the order of second and third moves could be flipped, particularly in texts with cycling, reporting first the presence of a significant difference and then providing relevant descriptive statistics.

Table 22 Examples of Steps in Results Sections

Move	**Steps**	**Examples**
General information about participants/sample	Reference to visuals	"The demographic, clinical, and laboratory characteristics and treatment data of these thirteen subjects are presented in Table 1." (Eller et al., 2021)

Results of measurements	Describing what happened in the research process	"These 2 patients were successfully weaned from VV-ECMO and mechanical ventilation and discharged from the hospital." (Boffi et al., 2022)
	Descriptive statistics, percentages, proportions	"The post-program knowledge survey score was 5.02, SD=1.2 and 15 (75%) learners met or exceeded the criterion of success for the post-program knowledge survey." (Garder et al., 2020)
	Reference to visuals (descriptive statistics, experimental process, data collected)	"Descriptive statistics of the respondents for hospital size and department size are shown in Figure 1." (Gresham-Anderson et al., 2021)
Results of analysis	Elaboration on the results (examples, explanations, post-hoc clarification, interpretation)	"…which pointed to a good accordance between the extension of the lung lesions on the chest surface and the volume of the lung injuries in COVID-19 pneumonia." (Volpicelli et al., 2023)
	Reference to visuals	"Table 4 demonstrates the relationship between clinical factors and overall hospital mortality for subjects intubated after HFNC failure." (Chandel et al., 2021)

4.4 Moves and Steps in Discussion Sections

Table 23 below displays the moves and steps that were identified in discussion sections. Many discussion sections opened with an introduction to the discussion. At a minimum, the introduction included the results or possibly the main result. The results could be preceded by an explanation of general related topics (such as current practices relating to topics that were researched, the importance of the topic, why the topic needed more investigation, definitions), the purpose of the study, and/or reminders about the methods or experimental process of the study. The order of these steps was flexible. Occasionally, interpretations and implications, more commonly appearing in the next move, could appear in the introduction to the discussion as well.

Table 23 Moves and Steps in Discussion Sections

Move	**Texts containing each Move**	**Steps**	**Texts containing each step**
Introducing the discussion section	52 (100%)	Explanation of general related topics	38 (73%)
		Purpose of the study	9 (17%)
		Reminder about the methods	27 (52%)
		Results	51 (98%)
Elaboration on the results	52 (100%)	Stating a result	49 (94%)
		Interpretation	29 (56%)
		Explaining the result	48 (92%)
		Comparisons to other studies	48 (92%)
		(Reasons for differing results)	13 (25%)
		Implications	47 (90%)
Limitations	50 (98%)	Limitations	48 (92%)
		Strengths of the study	36 (69%)

Note: Under Hüttner's (2010) classification, moves occurring in 90-100% of texts are considered obligatory, 50-89% of texts are considered "core," 30-49% of texts are considered "ambiguous," and 1-29% of texts are considered optional.

After the introduction, specific results were generally discussed in more detail. In this move, a result was generally stated (even if it was also stated in the introduction to the discussion). An interpretation of the result could follow this statement. Possible explanations of the result were frequently provided, often with citations other studies exploring possible causes of what was observed in the finding. In studies finding a correlation between two constructs, sometimes explanations of the factors potentially leading to the correlation that were not included in the study were described (x leads to an increase in __, which leads to a decrease in ___, which prompts ___, which leads to y, which may explain why a strong correlation was found between x and y). The explanation step could also include conceptual explanations of topics relevant to the finding, descriptions of why the finding matters, or explanations of why the

finding should cause alarm. Comparisons to other studies were also drawn. In 25 % of the texts analyzed, possible explanations for differences observed in other studies were provided, such as methodological differences that could affect the outcome or references to studies on other factors that could affect the outcome. Implications for research or practice were also provided in this move, although they could also appear in other moves. This move could repeat itself multiple times, depending on the number of individual results that the authors needed to discuss. In each repetition, different combinations of steps could be included. There was also flexibility in the order of steps. Some authors listed the results of comparison studies before the results of their own, and some provided explanations of general related concepts (a step from the previous move) to open the discussion of a result, transition between discussions of different results, or remind readers of information that is needed to understand the results. Reminders of the methods (a step from the previous move) occasionally appeared in this move as well.

Limitations were usually included at the end of the discussion section. In some cases, the limitations sections formed lengthy paragraphs. Two steps were identified in this move: listing limitations and describing strengths of the study. These steps often cycled, with a related strength listed after a limitation (e.g., "…the subjects were recruited from a single health-care area, which may be a limitation. However, this offered an additional advantage in that clinical care was similar and the same clinical practice guideline recommendations were followed" [Bote et al., 2020]), but they could also come separately (strengths then limitations or limitations then strengths). Reiterations of the research gaps that the study addressed were counted in the strengths step, and this could also occur in the introduction of the discussion as a reminder of the importance of the study or in the detailed discussion of the results as an explanation for the limited availability of studies to compare to the findings. Some authors concluded the discussion

section with a reiteration of the findings or implications, but as this information also tended to appear in the subsequent conclusion section, it was not common enough to consider these reiterations steps in the limitations move. Table 24 below provides an example of each step.

Table 24 Examples of Steps in Discussion Sections

Move	**Steps**	**Example**
Introducing the discussion section	Explanation of general related topics	"High-quality spirometry requires careful attention to quality control practices to ensure the equipment's accuracy and precision for producing reliable test results. Thus, routine performance of BioQC testing in addition to calibration procedures is vital for each PFL's quality control program to detect systematic errors that may occur with the technologist, the software, or the specific spirometer." (Becker et al., 2022)
	Purpose of the study	"The purpose of this study was to evaluate the barriers towards respiratory care degree advancement in a specific sample in a specific region." (Badgley & Koster, 2021)
	Reminder about the methods	"Our study explored the causal effect of circulating CRP levels on the risk of IPF using a two-sample MR analysis." (Zhang et al., 2023)
	Results	"Our results indicate that HFNC leads to significant improvement in OT, OD, OI, and TDI, which are valid and reliable measures of olfactory function." (Adiyeke et al., 2020)
Discussing results	Stating a result	"In our study, admissions requiring PMV > 21 d consumed 10% of all ICU bed days" (Cederwall et al., 2021)
	Explaining the result	"It is unclear the reasons for the contrasting findings between patients with asthma and those with COPD, but studies have shown that adults with COPD are more affected by COVID-19 than adults with asthma." (Quraishi et al., 2023)
	Interpretation	"The results indicated the potential value of TMAO as a surrogate marker in PH…" (Yang et al., 2022)
	Comparisons to other studies	"This is contrary to studies by Crump et al[4] and Webb et al,[5] who observed higher suicide risk among women with physical illness, and Strid et al,[2] who found more pronounced suicide risk in women with COPD." (Adviento et al., 2023)
	Reasons for	"This difference is probably due to the more frequent respiratory AGPs in subjects with COVID-19, such as

	differing results	talking, forced expirations, or coughing, which generate higher fugitive aerosol concentrations compared to healthy volunteers.[23-25]" (Li et al., 2022)
	Implications	"Clinicians should pay attention to usage of HFNC, particularly in patients at high risk for olfactory dysfunction, to maintain health-related quality of life." (Adiyeke et al., 2020)
Limitations	Limitations	"A second limitation is that with this pilot program, the budget for cricothyrotomy models did not allow for models that are as realistic and sophisticated as has been proposed in previous studies." (Mckenzie et al., 2019)
	Strengths of the study	"To the best of our knowledge, this is the first study in which GERD was shown as a predisposing factor for NTM PD using a longitudinal cohort." (Kim et al, 2023)

4.5 Moves and Steps in Conclusion Sections

Conclusion sections of the respiratory therapy research articles were generally brief, and many conclusions were too short to contain every conclusion move that was identified. The moves in conclusion sections are listed in Table 25. Some conclusions began with general statements about the topic of the paper, such as why the topic is important or reminders of the main problem that the study addressed. At a minimum, most conclusion sections (90%) contained a brief summary of the results. Some included an interpretation of the results (21%), and most included implications (85%). The implications move had two steps: listing practical implications (for healthcare or educational settings or policy revisions) and research implications. The choice of including both steps or one step appeared to depend on the writers' confidence in applying the findings to practice; some authors suggested more research before implementing their findings. Examples of each move are displayed in Table 26.

Table 25 Moves and Steps in Conclusion Sections

Move	**Texts containing each Move**
Discussing the general topic	9 (17%)
Stating results	47 (90%)

Interpretation	11 (21%)
Implications	44 (85%)
Practical implications	35 (67%)
Research implications	21 (40%)

Note: Under Hüttner's (2010) classification, moves occurring in 90-100% of texts are considered obligatory, 50-89% of texts are considered "core," 30-49% of texts are considered "ambiguous," and 1-29% of texts are considered optional.

Table 26 Examples of Steps in Conclusion Sections

Move	**Example**
Discussing the general topic	"There is no 'right way' for a health care provider to handle the death of a patient, whether it be a student encountering their first death or an RT with years of experience." (Fino & Case, 2022)
Stating results	"This study identified SciGPA and CumGPA as the best predictors of student performance on the CRT. The best predictors of student success on the WRRT include student exit GPA and student performance on the CRT." (Ari et al., 2008)
Interpretation	"This result demonstrates that the persistence of symptoms during ADLs may be present is independent of the degree of hypoxemia during exercise." (Zopelari et al., 2023)
Implications	
Practical implications	"This study has also identified several implications for RTs working in Singapore due to the unique circumstances in which the profession exists in Singapore." (Lee, 2022)
Research implications	"Prospective study of HFNC in COVID-19 is warranted to confirm these findings..." (Chandal et al., 2021)

4.6 Comparisons to Nwogu's (1997) Move Scheme: Introduction Sections

A few steps that have been identified in previous move analysis studies were less common in this corpus, and some additional steps were observed. Table 27 lists the parallel moves in steps in Nwogu's framework and the respiratory therapy RA corpus side-by-side, with differences and lack of correspondence noted. Definitions in introductions were common enough to constitute a step in the respiratory therapy RA corpus, but in Nwogu's (1997) framework, they could be assumed to fit in the "Reference to established knowledge in the field" step. The inclusion definitions goes against the trend that Bazerman (1981) observed for hard science

articles to rely on shared background knowledge between the writer and the intended readers. Li and Ge (2009) noted a higher prevalence of Nwogu's "Presenting background information" move over time, and since a very high percentage of the respiratory therapy articles contained the "Reference to general established knowledge" step, it could be concluded that this trend continued to some extent in this step, with some changes to the move. Nwogu (1997) had noted that many medical articles refer to the main research problem near the beginning of introductions, but this step was not observed in the corpus of respiratory therapy articles. Nwogu had separated "Presenting background information" from "Reviewing the previous research," which were also counted as separate steps by Swales (1990), but in the respiratory therapy RA corpus, the general background information could include cited information from previous research. After the general background information, references to studies with more specific information were included, such as the step for referencing statistics about the prevalence of a problem. For this reason, the separation between general and specific information was notable rather than the separation between background information and review of previous research. Nwogu's (1997) framework included limitations to previous research in the "Reviewing Related Research" move, but in the respiratory therapy corpus, a move parallel to Swales's (1990) "Establishing a niche" move was identified containing descriptions of limitations in previous research or the need for the study, limitations or problems in current practice, and reference to potential implications. The limitations or problems in current practice step is similar to Samraj's (2002) observation of highlighting gaps in the real world rather than the literature in conservation biology introductions, and Swales (2011) noted both types of gaps.

In the last move of the introduction, the only deviation from Nwogu's (1997) model in the respiratory therapy articles was the optional hypothesis. In spite of Branson's (2004) claim

that “novice writers” often forget to state the hypothesis in the introduction, 77% of the published articles analyzed did not include any mention of the hypothesis, indicating that this is an optional step. Currently, the International Committee of Medical Journal Editors (2025) requires that introductions include either the hypothesis or the objective of the study, and it appears that stating the objectives is a more popular option. Branson (2004) and Durbin (2004) recommend research questions to be included in introductions of respiratory therapy articles, and although some (5/52) included this step in the fourth move, not enough texts contained them for listing research questions to be counted as a step. Swales’s (1990) steps of “Announcing principal findings” and “Indicating RA structure” at the end of introduction sections did not surface in the respiratory therapy articles.

Table 27 Comparing Introductions in the Corpus to Nwogu’s Move Scheme

Nwogu’s Moves	**Nwogu’s Steps**	**Moves in the Respiratory Therapy RA Corpus**	**Steps in the Respiratory Therapy RA Corpus**
Presenting background information	Reference to established knowledge in the field	General openers	Reference to general established knowledge
	N/A		Definitions*
	Reference to main research problems		N/A
Reviewing Related Research	Reviewing Related Research	Referencing specific findings	Statistic about prevalence*
	Reference to limitations of previous research	Indicating the need for the study	Reference to limitations of previous research or need for research
	N/A		Limitation or problem in treatment or current practice*
	N/A		Reference to potential implications*
Presenting New Research	Reference to research purpose	Announcing the present study	Reference to research purpose

	Reference to main research procedure		Reference to main research procedure
	N/A		Hypothesis*

Note: First two columns are adapted from Nwogu (1997, p. 135); results in the present study differing from Nwogu's are marked with *

4.7 Comparisons to Nwogu's (1997) Move Scheme: Methods Sections

In the methods section, respiratory therapy research articles followed a sequence of moves that aligned with what Nwogu (1997) identified, but the steps demonstrated variation from his framework. Some of the changes in steps may be due to the advancements in technology affecting how researchers design studies. For example, the popularity of retrospective studies utilizing hospital records to search for factors connected to breathing problems is possible because of the availability of large samples of digital records. It is possible that the respiratory therapy RA corpus had more retrospective studies with large data pools than Nwogu's (1997) corpus. Additionally, guidelines relating to information that needs to be reported in research articles have evolved since the time of Nwogu's (1997) study; many journals require authors to follow regularly updated Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals from the International Committee of Medical Journal Editors. The moves and steps in methods sections in Nwogu's framework and the respiratory therapy RA corpus are compared side-by-side in Table 28.

In the first move of methods sections, articles in the respiratory therapy RA corpus included Nwogu's (1997) steps, but they also had additional steps that were not in Nwogu's model. For example, the first two steps, indicating the type of study and the timeframe of the study, were not mentioned in Nwogu's model. Many articles also contained more details about the data in the first section of the methods, as recommended by Kallet (2004) and Willis (2023). Additionally, as required by the International Committee of Medical Journal Editors (2025),

articles contained a statement about approval from an ethics committee or reasons that ethics committee approval was not required, with the exception of some studies without data from humans or other animals. The summary of procedures found in "slow" methods sections (Swales & Feak, 2004) were not common in respiratory therapy articles, but the first move performed a similar introductory function.

In the second move, there were further variations. At the beginning of the move, some steps outside of Nwogu's model were included. Any interventions performed were explicitly stated, as recommended by Branson (2004) and Kallet (2004). Reiterations of the purpose of each measurement or collection could be included before mentioning what was measured or collected. The constructs measured, variables included, or samples or data collected were stated, usually right before the description of how they were measured or collected. Many papers in the respiratory therapy corpus made reference to multiple individuals contributing to the data collection process or team caring for participants, and this information was also specified in the second methods move. A step parallel to Nwogu's step of "Identification of main research apparatus" was observed in the respiratory therapy RA corpus, but to broaden the scope of possible research instruments (such as surveys and rating scales in addition to equipment) based on what was seen, it was rephrased as identification of equipment, instruments, or tests. Measurement classifications and thresholds or operationalization of complex or abstract constructs were also included in the second move in respiratory therapy articles, and perhaps Nwogu observed this kind of information to be split among the "Recounting experimental process" and "Indicating criteria for success" steps in the second methods move and the "Identifying process of data classification" step of the third methods move. In the respiratory therapy papers, criteria for other classification besides success could be given. In some texts in

the respiratory therapy RA corpus, a step for referencing another text with more details about the methods was included, which is listed as an option in the International Committee of Medical Journal Editors (2025) guidelines. Reassuring readers that participants were treated well throughout the study, explanations of concepts that need to be understood to comprehend the methods, justification for methodological choices (recommended by the International Committee of Medical Journal Editors [2025]; also observed by Lim [2006]), and reference to visuals (as recommended by Willis, 2023) were also included in respiratory therapy articles but outside of Nwogu's (1997) framework.

The third move focused on the analysis of data both in Nwogu's (1997) description and in the respiratory therapy RA corpus, but many steps differed. Li and Ge (2009) describe that Nwogu's "Describing data-analysis procedure" move became more common in medical research articles over time, and in the respiratory therapy RA corpus of more recent publications, it could be considered an obligatory move. Nwogu's steps of "Defining terminologies" and "Identifying process of data classification" were not included in the data analysis move, as this information generally came in earlier steps. Among the steps that were identified in respiratory therapy articles that were not in Nwogu's model, the types of variables in the study were specified, and as Kallet (2004) described, the way the variables would be presented (as means, percentages, proportions, etc.) later in the results was specified. Variables were often listed (which aligns with Kallet's [2004] advice), even if they were mentioned previous moves, any compared variables could be reiterated, and excluded variables were specified. Justification for sample sizes was given, as Willis (2023) recommended. Additionally, in the respiratory therapy RA corpus, the goals of the study could be reiterated as reasons for using each statistical test (what the test would indicate). As required by the International Committee of Medical Journal Editors (2025),

statistical software was cited and the cutoff value for results to be considered significant was provided. Nwogu (1997) had mentioned analytical instruments in this move, but since almost every respiratory therapy study examined utilized a software or R, this citation was considered a step.

Table 28 Comparing Methods in the Corpus to Nwogu's Move Scheme

Nwogu's Moves	**Nwogu's Steps**	**Moves in the Respiratory Therapy RA Corpus**	**Steps in the Respiratory Therapy RA Corpus**
Describing Data-Collection Procedure	N/A	Describing the study and data	Type of study (retrospective, prospective, longitudinal, qualitative case study, etc.)*
	N/A		Timeframe*
	Indicating the source of data		Data source
	(later)		Data inclusion criteria
	Indicating data size		Data size
	Indicating criteria for data selection		Other data description*
	N/A		Ethics committee approval, reasons for not needing approval, or other information about research ethics*
Describing Experimental Procedures	N/A	Description of procedures	Describing the intervention (if applicable)*
	N/A		Purpose of measuring each variable*
	N/A		Constructs measured, variables included, or samples or data collected* Stating what was compared*

	(included in step 2)		How variables were measured or data was collected: Research, data collection, or care team description* Equipment, instruments, tests Measurement classifications & thresholds or operationalization of complex or abstract constructs* Reference to another publication with more details about methods*
	Identification of main research apparatus.		
	Recounting experimental process		Other descriptions of procedures
	N/A		Assurance of good treatment of participants* (interspersed as needed)
	N/A		Conceptual explanations or explanations of common practices* (interspersed as needed)
	N/A		Justification of methodological choices* (interspersed as needed)
	N/A		Reference to visuals (methods or treatment flow charts, classification tables, photographs of equipment)* (interspersed as needed)
	Indicating criteria for success		(included in measurement classifications & thresholds step)
Describing Data Analysis Procedures	Defining terminologies	Statistical or qualitative analyses	(included in conceptual explanations in previous move)
	Indicating process of data classification		(included in previous move)
	N/A		Stating the types of variables (continuous, categorical, etc.) and how they are expressed (means, etc.)*

	(possibly included in previous step)	(Laying out the variables)*
	N/A	Stating what is compared*
	N/A	Listing variables excluded from analysis (if applicable)*
	N/A	Justification of sample size*
	N/A	Reiteration of the goal of the study (the reason for the statistical test)*
	Identifying analytical instrument/procedure	Statistical tests
	(Presumably included in step 3)	Significance cutoff values*
	(Included in step 3)	Statistical or qualitative analysis software
	Indicating modification to instrument/procedure	N/A

Note: First two columns are adapted from Nwogu (1997, p. 135); results in the present study differing from Nwogu's are marked with *

4.8 Comparisons to Nwogu's (1997) Move Scheme: Results Sections

The results sections of respiratory therapy research articles varied significantly from Nwogu's (1997) model. Nwogu's model consisted of two moves. The first move, "Indicating consistent observations," contained three steps, which were "Highlighting overall observations," "Indicating specific observations," and "Accounting for observations made." Nwogu's (1997) second move was "Indicating non-consistent observations." The respiratory therapy corpus did not display this split between consistent and non-consistent observations, and this may be due to differences in the types of studies done in the respiratory therapy field. Instead, results were split into general information, descriptive statistics or other basic measures, and analysis results. Qualitative studies generally followed the same pattern as quantitative studies, sequencing information in the results by starting with general information about the participants and moving towards analysis results (themes in the data, interpretation of images, etc.). As Branson (2004) recommended, the order of the results moves were similar to those of the methods moves.

However, as noted above, cycling between the second and third move was also observed, particularly for studies with multiple analyses that completed these moves for each analysis before giving the second and third move of the next analysis (deviating from Branson's suggestions, but still following a logical sequence).

4.9 Comparisons to Nwogu's (1997) Move Scheme: Discussion Sections

Table 29 displays the similarities and differences between the moves scheme identified in this corpus and Nwogu's (1997) corpus. One key difference is that the texts in Nwogu's study tended to present the main outcome first and more specific details later, whereas both the main results and more specific results could appear in both the first and second move of results sections in the respiratory therapy RA corpus, contrary to Hess's (2023) and Branson's (2004) suggestions. Li and Ge (2009) noted Nwogu's "Highlighting overall research outcome" step becoming more optional over time in medical research articles, and perhaps what was observed in the respiratory therapy RA corpus aligns with this trend. The initial steps of explaining general topics (similar to Hopkins & Dudley-Evans's [1988] and Basturkmen's [2012] "Background information" step), reiterating the purpose of the study, and reminding the reader of the methods were not mentioned in Nwogu's scheme. In the second discussion move, in which specific research outcomes are discussed in Nwogu's framework and both general and specific results were discussed in the respiratory therapy RA corpus, there were many similarities. However, whereas Nwogu's corpus had explanations of the significance of each outcome, the respiratory therapy corpus had more varied forms of explanations of the results, such as explaining possible reasons for the results (in line with Hess, 2023), with implications appearing later. Basturkmen (2009) also observed explanations of results in discussion sections of applied linguistics research articles. Whereas Nwogu included a step for contrasting results with findings from other studies,

the respiratory therapy RA corpus had both comparisons to similar findings and contrasts with different findings in the step, with a possible substep of explaining reasons for the differences. Limitations came as a step in the "Explaining specific research outcome" move in Nwogu's (1997) corpus, whereas they formed a separate lengthy move in the respiratory therapy RA corpus, with an additional step of explaining strengths of the study. Kanoksilapatham (2005) also observed a limitations move in biochemistry articles, but not a step for presenting strengths alongside limitations.

Table 29 Comparing Discussions in the Corpus to Nwogu's Move Scheme

Nwogu's Moves	**Nwogu's Steps**	**Moves in the Respiratory Therapy RA Corpus**	**Steps in the Respiratory Therapy RA Corpus**
Highlighting Overall Research Outcome	N/A	Introducing the discussion section	Explanation of general related topics* Purpose of the study* Reminder about the methods* Results
Explaining Specific Research Outcome	Stating a specific outcome Interpreting the outcome Indicating significance of the outcome Contrasting present and previous outcomes Indicating limitations of outcomes	Discussing results	Stating a result Interpretation Explaining the result* Comparisons to other studies (Reasons for differing results*) Implications*
N/A	N/A	Limitations	Limitations Strengths of the study*

Note: First two columns are adapted from Nwogu (1997, p. 135); results in the present study differing from Nwogu's are marked with *

4.10 Comparisons to Nwogu's (1997) Move Scheme: Conclusion Sections

Nwogu's (1997) framework did not include conclusions as separate sections; the discussion section was the last section mentioned. However, in the respiratory therapy RA corpus, conclusions often appeared separately from discussions. As noted above, the first moves in the conclusion sections in the respiratory therapy RA corpus were stating general information about the topic, summarizing the results (similar to the "highlighting overall research outcome" move in Nwogu's discussion section framework), and interpreting the results (parallel to the "interpreting the outcome" step in Nwogu's discussion section framework). The summary of the results and implications could align with Hess's (2023) recommended "take home message" in concluding remarks. The last move of conclusion sections was stating implications of the study. The "stating research conclusions" move at the end of the discussion section in Nwogu's framework included two related steps: "indicating research implications" and "promoting further research." In the respiratory therapy corpus, recommendations for future research were based on the findings of the study and counted as implications. For example, in studies finding a link between two constructs, further investigation on why the link exists could be recommended. Practical implications and research implications were counted as two steps of the implications move in the respiratory therapy RA corpus. Table 30 below summarizes the differences in move-schemes for concluding sections (respiratory therapy corpus) or concluding statements in discussion sections (Nwogu's corpus). A key deviation from Nwogu's (1997) framework is that some of the information listed in discussion sections of respiratory therapy RAs is repeated in the conclusion section.

Table 30 Comparing Conclusions in the Corpus to Nwogu's Move Scheme

Steps in Nwogu's "Stating Research Conclusions" Move	**Moves and Steps in the Respiratory Therapy RA Corpus**
N/A	Discussing the general topic* Stating results Interpretation
Indicating research implications	Implications Practical implications
Promoting further research	Research implications

Note: First two columns are adapted from Nwogu (1997, p. 135); results in the present study differing from Nwogu's are marked with *

4.11 Conclusion

The move analysis results indicate that respiratory therapy RAs follow predictable move patterns, with variation in sequencing. The results have similarities with the results of other studies, but there are some differences, particularly in the steps within each move. Introduction sections contain moves for general openers, referencing specific findings, indicating the need for the study, and announcing the study. Steps that differ from Nwogu's (1997) move-scheme are stating definitions, statistics about the prevalence of an issue, limitations or problems in treatment or practice, reference to potential implications, and hypotheses. Nwogu's (1997) step of "Reference to main research problems" was absent from the respiratory therapy texts that were analyzed. The methods sections are composed of moves for describing the study and data, explaining procedures, and describing the analysis. Steps that differed from Nwogu's (1997) scheme were specifying the type of study, study timeframe, "other" description of the data, ethics committee approval, description of interventions, purpose of measuring each variable, constructs measured/variables included/samples collected, description of the research, data collection, or care team, measurement classifications and thresholds or operationalization of abstract constructs, reference to another publication with more details, assurance of good

treatment of participants, conceptual explanations or explanations of common practices, justification of methodological choices, reference to visuals, stating the type of variables used, listing the variables, stating what was compared, listing excluded variables, justification for the sample size, reiteration of the goal of the study, and cutoff values for significance. Results sections are comprised of moves for providing general sample information, reporting results of measurements, and reporting analysis results. The organization of results sections differed substantially from Nwogu's (1997) findings. Discussion sections contain moves for introducing the discussion section, elaborating on the results, and listing limitations. Steps that differed from Nwogu's (1997) framework included explanation of general related topics, restatement of the purpose of the study, reminder about the methods, explaining the result, providing reasons for results that differed from other studies, implications, and strengths of the study. Conclusion sections, with more variation, can contain moves for discussing the general topic, stating results, providing interpretations, and stating the implications of the study. The presence of a conclusion section that is separate from the discussion section diverges from Nwogu's findings, buut some of the conclusion steps in this corpus align with discussion steps in Nwogu's (1997) corpus. However, the step of discussing the general topic was not included in Nwogu's (1997) framework. The move analysis results can be used to inform EAP pedagogy by enhancing how teachers explain organizational patterns of research articles to respiratory therapy students.

5 RESULTS & DISCUSSION FOR RESEARCH QUESTION 2: FROM THE PERSPECTIVE OF STUDENTS AND FACULTY, WHAT ARE THE CHALLENGES THAT RESPIRATORY THERAPY STUDENTS FACE IN READING AND WRITING RESPIRATORY THERAPY RESEARCH ARTICLES?

This chapter addresses the results of the second research question, "From the perspective of students and faculty, what are the challenges that respiratory therapy students face in reading and writing respiratory therapy research articles?" The faculty and student participants identified some potential challenges in reading and many potential challenges with writing in their field through survey responses (students) and interviews (students and faculty). Tables 31 and 32 outline the survey responses regarding reading and writing challenges.

Table 31 Survey Results: Students' Perceived Challenges in Reading and Writing

Question						
What types of challenges do you encounter when reading research articles in English?	Understanding language 1/31 (3.2%)	Understanding content 11/31 (35.5%)	Identifying key information 11/31 (35.5%)	Speed 14/31 (45.2%)	Focus 7/31 (22.6%)	Other 1/31 (3.2%) Research language, for example but not limited to, post hoc 1/31 (3.2%)
What are the most difficult sections of research articles to read?	Abstract 6/31 (19.4%)	Introduction 0/31 (0%)	Literature review 6/31 (19.4%)	Methods 5/31 (16.1%)	Results 7/31 (22.6%)	Discussion 12/31 (38.7%)
What are the most difficult	Abstract 1/31 (3.2%)	Introduction 4/31 (12.9%)	Literature review	Methods 5/31 (16.1%)	Results 6/31 (19.4%)	Discussion 9/31 (29.0%)

sections of research articles to write?	12/31 (38.7%)

Table 32 Survey Results: Specific Challenges while Writing

Question									
What types of challenges do you encounter when writing research articles in English?	Finding sources 6/31 (19.4%)	Integrating source information into your writing 7/31 (22.6%)	Vocabulary 12/31 (38.7%)	Grammar 11/31 (35.5%)	Organization 11/31(35.5%)	Presenting the ideas clearly for the reader 11/31 (35.5%)	Connecting ideas 7/31 (22.6%)	Speed 15/31 (48.4%)	Other 1/31 (3.2%) Transforming ideas into writing
What are the challenges in writing a master's thesis?	Reviewing literature related to your topic 11/31 (35.5%)	Writing arguments for the importance of your research 6/31 (19.4%)	Explaining your project clearly 6/31 (19.4%)	Summarizing your findings 7/31 (22.6%)	Connecting your ideas 7/31 (22.6%)	Academic style 9/31 (29.0%)	Grammar 1/31 (3.2%)		

Interview data provided more details on students' experiences with the challenges listed above. Combining information from students and faculty, the areas of academic literacy challenges that

were identified include source-based writing, vocabulary, grammar, concision, organization, clarity, writing survey questions, choosing topics, and attitudinal factors.

5.1 Reading Comprehension

Although reading challenges were not as prominent as writing challenges in the department that was observed, some reading challenges surfaced. Faculty sometimes notice evidence of reading comprehension challenges when reading students' annotated bibliographies and other assignments requiring source-based writing. Potential evidence of reading comprehension challenges also surfaced in a professor's description of students' challenges with understanding assignment instructions. One professor attributed part of the difficulty of understanding academic texts to the vocabulary, based on conversations with students about medical vocabulary that appeared in reading assignments. Another professor also noticed many EAL users asking questions about the meaning of words on exams. In line with Evans and Green's (2007) results on reading challenges for undergraduate students, half of the respiratory therapy students interviewed mentioned some challenges with vocabulary. For some students, unfamiliar vocabulary related to statistics was especially challenging to understand, affecting their perceived comprehension of results and discussion sections of academic articles. Nejadghanbar et al. (2022) had somewhat similar findings on applied linguistics graduate students' difficulties understanding statistical tests and visual representations of statistical results, but less difficulty understanding statistical data and tables. One student interviewee found that discussion sections usually simplified the results in terms that were easier to understand, but this opinion was not popular. On the survey, answers on the most difficult section of research articles to read varied, but the most participants (12/31) rated discussion sections as the most difficult part, in spite of the simplified summary of results. Bitchener and

Basturkmen (2006) found that graduate students had limited understanding of what discussion sections are meant to achieve, and this could be a possible factor in the comprehension challenges for this section. However, there were fewer survey respondents who found it difficult to write discussion sections than survey respondents who found it difficult to read discussion sections.

Generally, interview participants found reading in respiratory therapy to be easier than writing, perhaps because their background from undergraduate studies and work gave them enough knowledge of the topics in the texts to help them understand the ideas presented. Among the survey participants, the key areas of reading that students wanted to improve were speed (14), identifying key information (11), and understanding content (11). Reading speed and identifying the main idea of paragraphs have also been ranked as the top reading challenges by master's students from mixed disciplines (Huang, 2024). Regarding speed, the most common area for improvement, one interviewee elaborated,

> I think as a graduate student, yeah, every one of us needs to, especially for internationals, every one of us needs to improve his reading and writing skills in terms of reading much faster than much faster as well. Like skimming the paragraphs, choosing which ideas and those paragraphs or newspapers. (Mike)

There is some evidence that reading speed may be linked to increased vocabulary acquisition (Reynolds & Ding, 2024), which makes it an important skill to improve. For three student interviewees, feeling bored while reading was also an issue.

> …I am I not the person who likes to read more. And when I see people who are reading, even if I go to Starbucks, I see a lot of people just having their books and they enjoy reading. And I'm like, well, I wish I can feel what they feel about reading it. (Cannizzaro)

Unfortunately, boredom while reading in a second language is associated with low reading performance (Jiang, 2023). Spending time doing an activity that is perceived as boring may influence students' engagement with the texts. However, for respiratory therapy master's courses, student interviewees estimated that they might read approximately 30 articles per semester, 50-80 pages a week, or 1-2 articles every weekday. It is possible that extensive reading, which can improve reading speed and comprehension, may help students approach reading tasks with more confidence (Hedgcock & Ferris, 2018). In addition to extensive reading, Hedgcock and Ferris (2018) recommend teaching EAP students intensive reading strategies to use before, during, and after the reading process that may be helpful for promoting reading engagement. Before reading, they suggest activating students' prior knowledge about the topic of the text, previewing the text, making predictions, and asking questions. While reading, they suggest strategies such as reading twice (once to get the general idea of the text and once to examine details) and paying attention to the language and structure of the text. Activities while reading can include highlighting important information, annotating the text, and completing graphic organizers. After reading, they recommend summarizing main ideas, responding to the text, using critical thinking skills, and making connections to writing. These strategies can guide students towards engaging with academic texts.

5.2 Paraphrasing & Citation

Five out of six of the instructors interviewed mentioned challenges related to paraphrasing or plagiarism. One of the challenges was making changes to the cited material that were substantial enough for the wording to be considered different:

> …you've got to be able to read something and be able to take whatever you read and convey it onto the page, but in your own words. And I think that's just tough for anybody,

> especially again, when you try to summarize items. I think summarizing, again, continues to be just a difficulty for anybody, but especially for someone who is not a native English speaker. And so they get trapped in, I think, at least in what I believe, they get trapped into this feeling like, oh, well, let me go reread this. Let me cut and paste some of these different words, terms, phrases. And so it's trying to make sure that they think on their own and that they use their own words. (Prof. Boyles)

Another professor mentioned, “I do see that sometimes where they just don't understand what plagiarism is and they said, well, I changed some words and it's like that, that's not how it works” (Prof. Smith). Insufficiently reworded paraphrase attempts could be a step towards successful paraphrasing (Pecorari, 2023); students displayed understanding of the need to reword ideas while conveying the same meaning, but they were not yet rewording the idea enough. One professor also noted that comprehension on the cited text can be a source of paraphrasing challenges, especially if the cited text is not written clearly:

> I do think that there is kind of a, sometimes like a jargon barrier, essentially, if that makes any sense. When they're going through and trying to paraphrase from some of these sources that they're seeing you know they're trying to take information that they're reading and again, put it into something they can use in their paper. Sometimes again, the wording that they use, in the original paper isn't clear either. And so it ends up, it's kind of ends up kind of like a game of telephone is the way that I see it, is like you know someone whispers in someone else's ear and then whispers into there and then all of a sudden, you know, read something, it's completely different from what we started with. (Prof. Smith)

Hirvela and Du (2013) argue that one of the values of paraphrasing is that it allows students to display their comprehension of texts. In cases like what is described by Professor Smith above, paraphrasing provides instructors with insight about students' misunderstandings, which is important to ensure that students receive feedback about the misunderstood content.

Paraphrasing challenges also surfaced in student data. 15 out of 31 survey respondents indicated that they would like to improve their paraphrasing skills. One student interviewee described, "I'm stucking with paraphrasing… if I'm just paraphrasing by myself, I believe there will be a stupid things" (Amonton). For one interviewee, not knowing synonyms for discipline-specific terms was perceived as a source of paraphrasing difficulty, but rewording discipline-specific vocabulary is not advisable in paraphrases. For another interviewee, avoiding unintentional plagiarism was a challenge. Respiratory therapy students' concerns about paraphrasing contrast with previous findings for graduate students in engineering, who did not see paraphrasing as a challenge (Lin & Morrison, 2021). The difference could be due to differences in the paraphrasing support that each participant group received in English courses prior to starting graduate studies or other forms of support during graduate studies.

Four out of six professors interviewed also mentioned challenges with citing material. One of the challenges was knowing when a citation would be needed:

> And then you don't have a citation for three pages and then you have one and it's like, oh, it's all common sense. Well, no, it's not. You have to support every idea with a citation, right? You're saying this happens and here's the evidence for it. And I try to put that into my teaching also, but that's something I think that you should get out of a graduate program. You don't necessarily have to know that going in. (Prof. Clausius)

> …you read the paragraph and the, and the topic changes halfway through, and there's only one citation at the end. And you know that there's no way that that first part of the paragraph came from that same citation, right? (Prof. McConaghey)

One professor has also noticed challenges with following citation style guidelines, but assumes that it might be an effort-related challenge rather than a lack of awareness of the existence of citation rules. However, Petrić and Harwood (2023) describe learning citation as a gradual process that evolves nonlinearly throughout a student's graduate studies. They describe a case of a student who was aware that she made citation format mistakes when attempting to cite correctly. The student interviewees were aware of the need to follow citation guidelines, but some formatting mistakes were observed in the in-text citations in the thesis corpus.

5.3 Literature Review Section

In line with some professors' observations of source-based writing challenges, some students described challenges in literature review writing. This theme also aligns with J. C. Huang's (2024) finding that graduate EFL students had difficulty using source information in writing. To write a literature review, students must find articles with ideas that they can read, understand, paraphrase, and cite, and connect ideas from multiple sources in a smooth, logical way. Six out of 31 student survey respondents rated the literature review as the most difficult section to write. Based on interview respondents' elaboration of the challenges in writing literature review sections, part of the difficulty appears to be attributable to reading processes. One possible piece of the difficulty can be attributed to ensuring that all the information included is relevant to the topic.

> Um, it takes long, longer time because you have to search a lot. And sometimes you feel like, oh, it's not good. After you finish, like after you finish the part, you feel, oh, it is not good or is not related with what I'm talking about. Like this. (Fatin)

The concern of accidentally writing irrelevant sections aligns with previous studies' findings on graduate students' struggles to achieve the purpose of the literature review. In a study on PhD students' literature reviews, Neupane Bastola and Ho (2023) found that many students do not adequately use the cited literature to indicate research gaps or advance their own research agenda. Like Fatin, other students also emphasized in conversations about literature-review writing the general time-consuming nature of reading articles to cite. One interviewee described, "If you want to write one page, you have to read at least 10 page that your mind can develop some ideas and generate some sentence" (Lussac). Reading large amounts before writing could be helpful for writing from an informed perspective, even though the process is time-consuming. In addition to the number of pages students need to read to have ample information to write a literature review, the type of reading behavior that students engage in can affect the time that they spend. Delgado-Osorio et al. (2023) analyzed students' writing processes while engaging in source-based writing tasks, and they found that the first time that students read the sources, they tend to read carefully rather than quickly. One of the participants in this study echoed their results:

> I have to read the other sources very carefully one by one and integrate it to my writing. This part, I think now I remember when I started writing my literature review. Yeah, I think I spent some times, it took me a long time, let's say, to do that because each bibliography or each literature review I'm writing needed me to carefully read or the

> article. So only timing. If you ask me if I would improve this, I would improve the timing because it takes me maybe a day for each article. (Clapeyron)

Although careful reading may help students absorb the details of the source texts, faster reading strategies may also be helpful. While engaging in source-based writing, writers at higher proficiency levels have been found to skim and scan while thinking of the goal of the writing task more than writers at lower proficiency levels, who spend more time processing individual words and understanding the texts (Plakans, 2009). Although Plakans (2009) did not have a large sample size, it is plausible that the reading-to-write speed could increase with language proficiency.

5.4 Speed

15 survey respondents indicated that writing speed was a challenge, and likewise, 15 rated writing speed as something they wanted to improve. Writing speed was also noted as a challenge by Odena and Burgess's (2017) and J. C. Huang's (2024) participants. Through the interviews, some of the issues underlying the self-perceived slow writing speed surfaced in participants' descriptions of their processes. As mentioned in the previous section, a key factor in slow writing pace was due to the time spent searching for sources to cite and reading to be able to write. Reading to be able to write is not something that can or should be avoided, but improving the efficiency of reading sources may indirectly help with writing speed.

Another piece of the undesired writing speed is taking time to think about what to write when there are many ways to word the same ideas.

> For me, I can't stand stay in front of the screen and I'll write something. No. I would just write, let's say the subject that I want to do. Then I'll leave it open and I'll leave from the table for a day or two days, and during these two days I'm thinking, what do you want to

> do? I would just have 4, 5, 6, 7 introduction in my head. Then after that, I will, I come to the screen or let's say to the PC and I will drive everything there. (Amonton)

This delay is not necessarily negative. By taking time to think about what to write, it is possible that the student may write a first draft with well-formulated ideas. However, for a large project like a thesis, waiting a day or two to think about each section may not be a feasible option. For another participant who had trouble starting writing projects, no ideas would come to mind for wording the thoughts they wanted to convey. One student described, "…sometimes you have the idea in your mind, but you cannot put it in words" (Avogadro). Increased listening and reading proficiency is a predictor of faster writing speed (Révész et al., 2022), and it is possible that increasing English proficiency level could help with the challenge of putting ideas into words, but some participants described facing difficulty putting their thoughts into writing in their first language as well. Pre-planning before writing, which can lead to increased writing speed for timed argumentative essays (Abdi Tabari, 2021), may be helpful for both writers who are slowed down by considering many ideas and writers who are slowed down trying to think of ideas, but more data would be needed to confirm whether this trend applies to to other genres without time limitations. Amonton mentioned difficulties with outlining, so it is possible that pre-planning skills could help them start with a decided idea and write more fluently. In timed argumentative writing tasks, writers who have pre-planning time can allot more of their attention to vocabulary during the writing process (Abdi Tabari, 2021), which may be helpful for writers like Avogadro if the trend applies to untimed writing in other genres. However, more research would be needed to confirm whether the effects of pre-planning are applicable to untimed writing tasks.

5.5 Vocabulary

12 out of 31 survey respondents identified challenges relating to vocabulary in writing. As vocabulary is associated with second language writing performance (Yang et al., 2019), this challenge is important to address. Similar to Lin and Morrison's (2021) findings on engineering graduate students' trouble with synonyms, words with similar meanings were one source of difficulty. One student explained, "Sometimes I use the wrong vocabulary because sometimes the supervisor or the committee want, wanted the specific vocabularies. Sometimes this is correct and there is something more correct than it" (Avogadro). Interview participants described choosing words with the same meaning as the ideas that they wanted to communicate that were not always appropriate for the register:

> When I'm writing, grammar in general, and actually some academic words, because sometimes I can go with the slang language, they will understand me, I'm pretty sure, but it's not the position where you need to just put that word. There are some other vocabularies would explain it and it'll be more academic. (Cannizzaro)

The above excerpt highlights the participants' self-described need for academic vocabulary. A professor also mentioned noticing a similar scenario recalling the challenges identified in a recent thesis they read, saying that they were, "…just making sure that they're using, again, the jargon that matches up with American style medical terminology instead of, sometimes the translation is just a little bit off for them as far as how they're trying to explain it" (Prof. Smith). Concerns about discipline-specific vocabulary were not expected from this participant pool. A study on graduate engineering students' writing challenges had identified vocabulary in general to be challenging for students, but technical vocabulary to be easier (Lin & Morrison, 2021). Many of the participants in the present study attended English-medium

respiratory therapy programs for their undergraduate degrees prior to coming to the United States, which could theoretically give them a strong discipline-specific vocabulary background. However, some participants described attending programs that claimed to have English-medium courses that actually relied more on the students' first language. Additionally, attendance of courses conducted in the second or additional language does not guarantee acquisition of every important term, especially for adult language learners.

5.6 Grammar: Faculty Perspectives

Grammar was a frequently mentioned writing challenge that students faced in the master's program, from both the faculty and students' perspectives. From respiratory therapy instructors' perspective, in some cases, grammatical errors interfered with the ease of understanding student writing. One professor explained, "The other problem is just the grammar sometimes is unreadable. It's like I can't even understand what the sentence means. What are they trying to get at?" (Prof. Clausius). In other cases, it was seen as an issue that was very time-consuming in the writing feedback process, especially when many students needed grammar help at the same time:

> …with our international students, they tend to have the, it seems to me they have the science down. **I tend to help them more with the grammar aspect of it, of it in the sentence structure and things like that. And that can be a little overwhelming at times** when you have a large number of, of international students. Um, and, you know, don't get me wrong, they speak English much better than I can speak any other language that there is, but still they need a little, little bit of extra help with the sentence structure and things like that. (Prof. McConaughey)

Some faculty members were able to offer information about specific grammatical features causing difficulty, in addition to sentence structure (mentioned above). One faculty member elaborated,

> …sometimes just like word order or like you know they'll have **really long like run on sentences are a big issue** where it's like, **we'll have a sentence that's like half a paragraph** and it's like, we got to break this up a little bit. And so pieces like that, as far as their words that they're using, it's not necessarily the issue all the time, **it's just the order that they're putting the words in and the way they're choosing to put those together can become confusing.** And so they'll say things kind **of switched around or backwards**. And then a lot of them choose to do survey based theses. And so sometimes just like figuring out like **how to write a question** or like **a reverse coded question** sometimes can be difficult for them to understand where you know you're asking for basically the reverse of it. But those are the parts where we come into a lot of roadblocks is mainly just you know getting clear, coherent writing from them. (Prof. Smith)

Another professor specified, "You get into the first paragraph and you're dealing with **conjugate errors**, you're dealing with **subject verb disagreements**, you're dealing with just, you know, **weird prepositional use**…" (Prof. Wright). From these quotes, it can be determined that these instructors view sentence structure, word order, particularly with questions (which are relevant in respiratory therapy for writing survey items and research questions), subject-verb agreement, and preposition choice to be grammatical challenges that appear in the genres of writing that respiratory therapy master's students compose. However, types of errors are likely to vary with proficiency level, and it can be assumed that any grammatical feature that is frequently used in respiratory therapy writing could be pedagogically relevant, depending on what each language

learner has already acquired. The impressions of long run-on sentences could align with the MDA findings (see Chapter 3) on differences in student and expert writing in features relating to concision, elaboration, and linking. In comparison to published research articles, theses contained lengthier features used for description and more phrasal coordination (multiple connected phrases), leading to wordy sentences.

Grammar is also connected to style, and "choppy" writing was mentioned by two professors:

> …it comes off a little choppy all the time as well. Like it's either like one big run on sentence or lots of small little sentences in a row. And so again, which makes sense to me, even again English speakers, that's something that you learn is how to vary your sentence structure and to make it flow a little bit better and come out a little bit more naturally. So I feel like that that's a part that if you gave us in the department two papers, we could probably figure out which one was international student, which one wasn't just based on basic sentence structure. (Prof. Smith)

Based on the professor's description of "choppy" writing, choppiness does not necessarily involve any grammatical errors, but rather lack of sentence variety. Whether students have a "sentence that's half a paragraph" or an abundance of short sentences, the "flow" of their writing may be viewed negatively. Although syntactic complexity has been associated with high ratings of writing quality (Casal & Lee, 2019), half of the respiratory therapy professors interviewed made comments that seem to indicate a preference for a balance of short and long sentences.

5.7 Grammar: Student Perspectives

Grammar was also noted as a challenge from students' perspectives, in line with Hirano's (2014) findings. 11 out of 31 of the survey participants identified grammar as the most

challenging part of writing, which is a higher proportion of students than Lin and Morrison's (2021) respondents. Many interviewees elaborated on the challenges. Interviewees who faced challenges with grammar described grammatical difficulties as confusing, and interestingly, students sometimes had a feeling that they made grammatical errors without being sure what the grammatical errors were. One student described,

> If there is no grammar checking and I just paraphrase by myself, always I will have some stupid ideas, but when I was grammar checking, when I was using the grammar check, even nowadays I'm writing I'm paraphrasing something before I'm going to grammar to check. **I know this is mistake. I have to check. No, no, I have to modify it.** Then I will keep, like if I read something and I know this is a mistake, I just to modify it. (Amonton)

Another student echoed this concern, explaining, "Sometimes I feel like something like **you feel it's something wrong, but you don't, don't know what is exactly, especially in complicated,** like past perfect mark, like this" (Fatin). Past perfect was mentioned by more than one student participant, but it was not frequently found in the corpora (.02 occurrences per 100 words). It may not be as important to prioritize as the participants are thinking, but more than one student interviewee mentioned challenges relating to aspect and tense. Another student mentioned, "Sometimes it can be difficult with the grammar sometimes from transitioning past participment to, you know from past to part participant or sometimes if you lost track of the tense" (Avogadro).

It can be seen from these quotes that the participants have some knowledge of grammar, in that they sense when they made a mistake and they know that writers may need to switch between past and past perfect in one description, but their knowledge of English grammar is still in the process of advancing. Although English teachers sometimes view grammar as a topic that

might not interest students, 11 out of 31 survey participants indicated grammar as an area of their writing that they wished to improve. Polat (2013) found that students at higher second language proficiency levels mentioned grammar improvement more than students at lower proficiency levels, and perhaps the respiratory therapy students who met the proficiency requirements to start graduate studies in the US are interested in learning the grammatical features that they need for academic writing. Interview participants' awareness of having gaps in their understanding of grammar and perhaps the expectations to write academically may contribute to their interest in improving grammar. One respiratory therapy professor interviewed mentioned that some students ask them for resources to continue to improve their grammar even after they graduate.

5.8 Concision

Four out of six of the professors interviewed described concision as a feature of high-quality writing in their field. Although participants criticized "choppy" writing, they are aware of the dense information packing in their field. Writing that is too verbose is also criticized:

> It's very wordy. They [students who do not follow professors' suggestions] think that the more words better is better. They don't believe, we always try to instruct them to write dense, right? So I don't limit words or have a limit to how much they have to write just because I hate it when students are too wordy. So just write dense. I always tell 'em, write dense. If you can relay information in a couple of sentences over two paragraphs, and by all means, that's best. So the differences between the two is one's easy to read it. (Prof. Charles)

Like Professor Charles, Biber and Gray (2010) also found academic writing to be "compressed," with grammatical features that allow information to be packed into few words. Like the professors' impressions of students' long run-on sentences, the impression that student writing

can be wordy aligns with the MDA findings (see Chapter 3). The corpus of master's theses had a higher frequency of wordy elaboration structures. Assumptions about how to make writing dense aligned less perfectly with the corpus data:

> I think it was Mark Twain who said, anytime you want to use, um, an adjective, use the word *damn*, and then your editor will take it out and your writing will be just as it should be, right? And I think one of, you know, it's like, so what I try and, and get them to understand is that academic writing is focused, it's not flowery. It's not descriptive in that, it's descriptive in that here's what I did, and here's how to repeat the study if you need to, but it's not full of adjectives and then there's no opinion in there, right? (Prof. McConaughey)

Attributive adjectives actually had a high frequency in the respiratory therapy research article corpus (9.57 occurrences per 100 tokens), but as Prof. McConaughey suspected, they were often used for "here's what I did" descriptions, specifying information that would be necessary to repeat the study. Frequent attributive adjectives included *respiratory*, *clinical*, *pulmonary*, and *significant*. The use of attributive adjectives can actually contribute to concision by adding descriptive information in a single word. Specificity was mentioned by 4 out of 6 professors as a characteristic of high-quality writing in respiratory therapy, and attributive adjectives can allow writers to specify details concisely. However, achieving a balance between specifying important information and writing concisely can be challenging:

> I think sometimes medical writing has some terse, you know there's terse writing to that where it's really to the point. And at times it, it's pretty simple. But I think at times it can be very hard and try, because we see that a lot of times the students will, they like to carry, they like to write a lot about something that doesn't matter as much as that can be

> shortened where we need to expand these other areas. So I guess understanding on the writing where they need to be terse and then where they need to expand and be more technical in their writing. (Prof. Boyles)

Based on these impressions from professors and other themes in their interviews, it is possible that some master's students are still learning ways to write concisely, but not "choppily," while including sufficient details. The comments from the professors imply that the concision elaboration balance appears to be influenced by the level of detail that needs to be conveyed. The challenge of concision in graduate student writing has been noted in other studies. Lin and Morrison (2021) had a very similar finding about the writing challenges that graduate students face in engineering: instructors emphasized students' difficulties regarding concision, while students did not mention concision as a writing challenge. Hyland (2013) also found that professors of biology, physics, and economics checked for concision in student writing. The dimension 1 (Chapter 3) results can offer insight on what features students can use to improve their concision (attributive adjectives and past participial clauses).

5.9 Organization

The professors interviewed described high quality writing as having good transitions and a smooth progression of ideas, and lack of "flow" was listed by one professor as a reason that papers could get rejected from journals. However, half of the professors who were interviewed mentioned noticing student challenges relating to organization and cohesion in writing. They commented on the "flow" of ideas in student writing and the lack of connection between sentences.

> Well, a lot of it, it depends on the student, but a lot of times I think when somebody doesn't understand the language very well, they tend to write very disconnected passages.

> One, the sentences might be grammatically correct, but it might say something like first sentence might talk about these number of people have COPD, and then the very next sentence might say something totally unrelated to that and you're like, why are you jumping from this to this? And it's like there's no logical progression of ideas a lot of times. (Prof. Clausius)

Lin & Morrison (2021) also found that organization and linking sentences were a challenge for graduate students. However, in their participant pool, faculty emphasized these discourse-level challenges more than students, but in the respiratory therapy participant pool in this study, both faculty and students discussed these challenges. Seven out of 31 student survey respondents found connecting ideas in writing to be challenging, and 11 out of 31 survey participants found organization in general to be challenging (but curiously, only 10 out of 31 hoped to improve their organization in writing). One student interviewee elaborated on the cultural side of the organization challenge when asked about the biggest challenge in writing research articles:

> The things for me, I believe the outline. It's really making it difficult for me and I believe this is because the barrier that I have in English yet, so it's difficult to me to think because I still have this difficulty how to shift my thinking from Arabic to English. This is the difficulties, and even as you know, we have our ways of writing something. It's not like the English way, how to write their things. (Amonton)

Hyland (2019) describes that texts may be structured in different arrangements (such as placing the main point at the end of an introduction or the beginning of an introduction, or leaving the main point to be inferred), and writers may present ideas in structures that are similar to what they have read and what the readers' expectations are assumed to be. Hyland views organization in writing as a construct that is influenced by the social norms of writing, which can vary across

communities. Learning writing in an additional language may involve adopting new organizational schemata for many genres. While Amonton had awareness of different "ways of writing," they expressed difficulty with outlining paper plans in English. Zhu (2001) had similar comments from participants who could describe differences in written organization in their first languages but were not confident in their organization in English writing.

5.10 Presenting Ideas Clearly

Perceived "clarity" was listed by four out of six professors interviewed as a feature that is valued in respiratory therapy writing. Clarity may be a subjective concept, but issues relating to clarity that professors described were including all necessary pieces of information about the methods of a study, providing specific details, making transitions between ideas easy to follow, and more generally, presenting ideas in a way that is understandable to readers. One professor described perceived unclear writing, as, "I'm confused when I read, I have to stop, mark it up and ask questions. My feedback is questions I don't know" (Prof. Charles). Some professors mentioned that perceived clarity can even be an issue for papers submitted for publication. One professor noted that journal reviewers in their field often request revisions relating to clarity, such as adding more specific information about study methods. Some of the professors who were interviewed found that clarity in English writing could be a challenge for some students. Many students agreed; 11 out of 31 survey respondents found it difficult to present ideas clearly in writing. Student interviewees did not elaborate on this challenge, but one student interviewee mentioned being careful to make sure their arguments were clear. Another student interviewee described a potentially related challenge of putting ideas into words, explaining, "It's very challenging for me to express the ideas in my mind in just writing" (Wama). The challenge of clarity in EAL writing has been noted in other studies. For example, Lin and Morrison (2021)

found that graduate engineering students also identified clarity as a writing challenge. Bitchener and Basturkmen's (2006) interviewees also included difficulties with linking ideas as a challenge with clarity, because forming clear connections was difficult. For the respiratory therapy students, it is possible that the challenges with vocabulary and grammar contribute to the challenge of putting ideas into words, which may result in the challenge with clarity at a sentence level. The challenges with organization could also contribute to the discoursal clarity.

5.11 Writing Survey Questions

According to some of the respiratory therapy professors, writing survey questions can be a potential challenge for students. One professor noted that surveys are very common in their department because of the type of research that is typically done, especially with the practical constraints that master's students have. For surveys in the field of respiratory therapy, Rubenfeld (2004) recommends avoiding combining two questions into one, reference to an influential source (that respondents might feel compelled to agree with), "loaded" questions, double negation, comparative words with no comparison option provided, specialized jargon, and difficult vocabulary. Based on the faculty member's comments, students may have other challenges with writing survey questions. As discussed above, question grammar is one contributing factor to the challenge of writing surveys. Even in the absence of grammatical challenges, some professors have seen international students having difficulty with creating questions that will elicit useful data. As one professor described, "…they'll make up questions that have nothing to do with what they say their research question is" (Prof. Clausius). A related challenge in survey-question writing is lack of clarity. One professor described seeing students have difficulty with, "…being able to write a, come up with a survey that has some validity to it, just because, again, sometimes the questions that they're asking aren't very clear" (Prof. Smith).

It may be worthwhile for future studies to collect examples of questions written by students that faculty perceive as unclear and ask the student writers what information they expect the questions to elicit. Survey questions that do not directly ask about the topic of interest have been found to be more effective than direct questions for gathering data about sensitive issues in some cultures (see for example, Gibson et al., 2018 for a comparison of direct and indirect survey questions on a sensitive topic). It is possible that students' cultural backgrounds could influence their ideas of how directly each question should be worded and what the anticipated answers to their questions would be. One faculty member also mentioned international students having difficulty understanding test questions in English. In light of the mutual confusion about questions, assessing the validity of students' survey questions within the cultures of the participants they plan to recruit could be recommended. The thesis corpus contained studies with surveys distributed both in the US and in other settings, so some master's students may not necessarily need to align their questions to the expectations of respondents in the US, but rather to the expectations of their study context.

In both observations and interviews it was noted that students do not need to write their own survey questions if an existing survey on the same topic is available. The professors prefer that students use a survey that has been validated, and students are encouraged to look for published options. According to the professors interviewed, it is common in the field of respiratory therapy for researchers to use the same survey. Using published surveys can make it easier for students to compare their results to previous literature. However, if no published survey is available on a topic of interest, students have to write clear questions and validate the survey. One student participant shared a story about not knowing this trend and assuming that they needed to draft their own questions:

> …the first thing I did, because I thought it was right, I wrote questionnaires. Then I sent it to Dr. [professor's name]. He said, 'Where's your, did you validate the questionnaire?' I said, 'No, I did not know about validation. I thought the researcher is just basically write questionnaire and send them to uh, yeah.' So I had to validate the questionnaires. I had to sit with the committee and do everything. Then I sent them to the target population. (Clapeyron)

For respiratory therapy students using surveys, it may be helpful to learn about how to search the literature for validated surveys, and for students who are not able to find published surveys, question-writing skills may be valuable.

5.12 Topic Choice

Some of the professors interviewed mentioned that choosing a good thesis topic can be challenging for some students. One student interviewee attributed the difficulty of choosing a topic to limited experience in the field:

> The second stuff, I found it difficult that, which topic should, shall I choose? Because I don't have a lot of experience about in my field yet. I'm not working at all before, I just have internship or a rotation in different hospital for only one year. So I don't have good experience. (Fatin)

Another student interviewee with even less experience in the field decided to choose a topic related to what they experienced in clinical rotations after initially feeling "unprepared" to pick a topic. Students can browse theses previously written in the department when they are thinking of topic ideas. However, one of the concerns that surfaced in interviews with professors is the similarity of thesis ideas among students:

> …the students they [faculty members] get are looking at like, 'What's your perception about knowledge on this in Saudi Arabia,' it's like every like 90% of the theses come out of our department are like, 'what's the perceptions about this procedure in Saudi Arabia?' It's like, I've seen a lot of that. Yeah. Oh my God, why are we doing this? This stuff is not publishable. (Prof. Clausius)

Theses about practitioners' perceptions and knowledge of specific procedures in specific locations were common in the student corpus (including the thesis of the student quoted above who had trouble deciding on a topic), but many theses on these topics do get published. The examples of published papers on these topics highlight important training and education needs. However, based on the professor's concern, it is possible that students are over-relying on examples of theses from previous semesters when brainstorming ideas. Repeating the same type of topics may limit the amount of theses contributing other types of findings. In contrast to this trend, one student interviewee chose to do a systematic review specifically because they had the impression that there are not enough systematic reviews written by respiratory therapists. Swales and Feak (2004) recommend that graduate students look for gaps in the research in their field. By choosing topics that address research gaps, students' theses can make meaningful contributions.

The respiratory therapy faculty mentioned that they want students to choose a topic that interests them, and they encourage them to read about the topics they are considering at the beginning of their program. However, another concern about topic choices was that students try to pick "easy" topics:

> It comes down to most of our students coming to the thesis writing process with the only goal of getting it done, not the goal of doing something good. So what is the easiest way to do something is what we encounter a lot. So we hear students come very often and

> their idea is to measure knowledge. And measuring knowledge is a, nobody's going to self-report, I don't know, something, they're going to lie to you. It's not going to be good information to be able to report. So I would say the number one problem is just poor, poor topics is probably the most part… (Prof. Wright)

The issue of graduate students selecting topics based on ease has been noted in previous studies (Xia, 2013). In the United States and in other individualistic cultures, passion is associated with high academic achievement (Li et al., 2021). It is possible that professors may be expecting students to be passionate about the thesis topic that they select, and students' practical concerns about the ease of a topic could come across as lack of care. In a survey of students from multiple fields, Xia (2013) found that personal and academic interest in a topic are key criteria for graduate students' dissertation topic selections in the US, but students may forgo these criteria due to other influences on their choices. One student interviewee described choosing an "easy" topic because of time limitations:

> Well, it's a two year program, and I was planning to take it in a one year and six months, which is only three to four semester, I'm not sure. So I wanted to choose a topic that is very easy, that I have easy access to the participants, and that is, that I can finish it early. Do I like it or not? I don't like it because it's not something directly related to respiratory therapy. I know I wouldn't have time to work on something that I really want because of the time, just a matter of time. (MB)

It may be important for international students to speak with faculty in their department about their perspectives of criteria for thesis topic choice.

Topic choice difficulties also surface in smaller assignments. When students are completing assignments for their courses, they are often encouraged to pick topics that are related to their theses or projects. Topic choice challenges can be observed in these early stages:

> Some of ‘em might get a little bit gung ho and want to bite off a little bit more than they can chew in their first semester. Topics that are too broad or too specialized or something that they don't really have the context or some of these more advanced mechanical ventilation tactics like [unclear- APRV or HFOV] really interesting, but you don't really have the context for it at that point in the program. So I clear that with them and give them feedback. (Prof. Smith)

Although selecting a topic can be challenging, students have some time to read about their ideas before making a final decision, and they can try different topic ideas for their small assignments if needed. For one interviewee, being forced to pick a topic for a small assignment was helpful motivation for making a decision about a thesis topic early in the program, which helped them make progress from the beginning.

5.13 Emotional Writing Challenges

Finally, some students expressed writing challenges that are related more to emotions than language. One student, Lussac, described the role of mood in the writing process, sometimes spending two days doing nothing and other days being able to process more information. Another student, who described having a sense of perfectionism and self-induced pressure to avoid any writing mistakes, felt nervous when starting writing projects. They explained, “If I don't have the idea, sometimes I'm not having the idea. I'm feeling nervous, and once I'm feeling nervous, I can't think it. Yeah” (Amonton). Unfortunately, second language writing anxiety is associated with lower performance (Tahmouresi & Papi, 2021). Two

interviewees admitted that they did not enjoy writing. One of them said, “I don't like writing. Yeah. This is a straightforward answer. I don't like writing. That's why I chose the advanced route” (Wama). Wama described writing as difficult and time-consuming, but they believe that they need to improve their writing to accomplish their future goals. Weston, who was writing in English as a first language and also dislikes writing, described their mind wandering to more interesting activities when they tried to start writing:

> You know, hey, maybe I'm hungry. Yeah, let me go get something to eat. Or maybe I should go play with the dogs, or a hundred other things that unfortunately were a lot more interesting in just sitting down and banging it out. Again, motivational, as I'd mentioned earlier, was an issue. (Weston)

According to a meta-analysis on the role of boredom in language learning, boredom is associated with low achievement in second language writing, including writing that integrates reading (F. Huang & Zhang, 2025). These emotional and motivational concerns could potentially be addressed in writing classrooms. For example, Yu et al. (2023) found genre-based approaches to be effective for improving both engagement and motivation in second language writing.

5.14 Summary of the Challenges

In sum, students face many academic literacy challenges, but the specific challenges vary for each individual. Common source-based writing challenges include reading comprehension, paraphrasing, citation, source-based writing speed, and more generally, writing literature reviews. Student participants perceived speed and literature review writing as challenges more than their instructors. Other challenges include vocabulary, grammar, concision, organization, clarity, writing survey questions, choosing topics, and maintaining a mood that promotes writing engagement. Students and instructors agreed on most of these challenges, but concision and

question writing were only mentioned by professors and mood-related challenges were only mentioned by students. In spite of these challenges, many EAL students successfully write theses and other genres that are important in their field. The following chapter addresses the ways that students overcome academic literacy challenges.

6 RESULTS & DISCUSSION FOR RESEARCH QUESTION 3: WHAT STRATEGIES OR SUPPORT HELP RESPIRATORY THERAPY GRADUATE STUDENTS MEET READING AND WRITING CHALLENGES?

The third research question addressed strategies or support that help respiratory therapy master's students meet reading and writing challenges. Table 33 provides the results to the survey questions addressing this topic. The results from faculty and student interviews, detailed in the sections below, provide more insight on these trends. The ways that respiratory therapy students meet academic literacy challenges can be categorized as development of reading and writing strategies, guidance from instructors, and support from outside of the respiratory therapy department.

Table 33 Survey Results: Ways that Students Address Reading and Writing Challenges

Survey Question					
What are some ways that you deal with the challenges of reading in your respiratory therapy classes?	Talking to your instructors about the texts 14/31 (45.2%)	Talking to your classmates about the texts 8/31 (25.8%)	Looking for other sources of information on the topics you are reading about (other articles, videos) 17/31 (54.8%)	Focusing on key information in the abstract and conclusion 19/31 (61.3%)	Other 0 (0%)
What are some ways that you deal with the challenges of writing in your respiratory therapy classes?	Asking your advisor or other instructors for help 15/31 (48.4%)	Going to the Writing Studio 6/31 (19.4%)	Using computer tools (like Grammarly) 21/31 (67.7%)	Other 2/31 (6.5%): AI (1/31, 3.2%), no comment (1/31, 3.2%)	

6.1 Reading and Writing Practice

One of the ways that students overcame academic literacy challenges was developing helpful routines. Seven out of 10 student interviewees emphasized the importance of reading practice. Even a participant who thinks that reading is boring believed that the only way to improve reading was to practice reading. Some participants practiced reading academic texts. A few student interviewees also included reading for nonacademic activities (such as booking cabins or shopping) and pleasure reading (such as the Oxford Bookworms graded reader library and parenting books) as English reading practice. Based on students' estimation of their reading homework load, they also have substantial practice reading in their field from the texts assigned to them. The students' appreciation for reading practice is supported by second language reading literature. A meta-analysis of extensive reading studies found that extensive reading is an effective way to improve second language reading (Nakanishi, 2015). Extensive reading can improve second language reading comprehension, speed, and vocabulary (Suk, 2017).

Seven out of ten student interviewees mentioned writing practice. Some of the students practiced writing individually outside of their classes, and they recommended that other students planning to start a respiratory therapy master's program practice writing as well. Participants also recommended writing practice in ESL classes. Regular writing practice has been found to increase second language writing fluency (Nguyen, 2015). Since writing speed was one of the skills that many respiratory therapy students wanted to improve, the interviewees' writing practice strategy could be beneficial.

6.2 Reading-to-Write Strategies

The student participants also developed strategies for reading sources to cite in their writing. In the survey, 19 out of 31 participants indicated that they used abstracts and

conclusions to focus on key information. However, out of three respondents who used this strategy in isolation (without using any other reading strategies), two indicated that it was not helpful and one did not answer the question about whether it was helpful. In contrast, participants who combined this strategy with other strategies found their approaches to be helpful. Some other strategies used by student interviewees included categorizing articles, looking for common themes, and comparing the perspectives presented in articles before writing. These synthesis skills are very crucial in academic writing (Grabe & Zhang, 2016). Students also developed ways of organizing the information that they learned from reading:

> Yeah, well, I used to classify the articles into useful, might be useful, and not useful. In addition, in each article I used to write my own summary highlighting as well, my notes. So next time if I want to get back to this article, I will not waste my time to read it from a zero. (Mike)

One participant felt more prepared to start writing after building background knowledge through reading. The reading skills that students develop are very important for academic writing success. Grabe and Zhang (2016) describe the multi-faceted relationship between reading and writing for academic genres. Reading can provide input for students to learn from to inform their writing, reading and writing skills often develop in tandem as students' proficiency increases, and improving reading-to-write skills can lead to the production of higher quality written products. In the respiratory therapy department observed, annotated bibliography assignments help professors assess students' reading-to-write skills and offer guidance when needed.

6.3 Following Example Texts

Examining examples of texts in a specific register was one strategy that students used to plan their compositions. Example texts can give students ideas about the organizational

framework and expected style of texts in a specific register. Some of the respiratory therapy instructors provided examples of assignments from previous semesters, and students found this practice to be very helpful.

> …if I want to write something, a project, I will, even if the teacher or the professor give us an instruction, for me, it's difficult to start. No, I have to read the example. Then I'll go to another example. Then I'll go to another example. Then I'll go to another example. I see, oh, let's see, what did they say? How did they drive their idea? Each one of them have another way, another subject. They have another subject, but how did they drive their idea? How did they start? How did they write the literature review? This helped me actually… (Amonton)

Examples of theses available online were also helpful for students:

> …maybe when I started, I had zero experience in research. So this is what I used to do. I used to, you know the thesis pages. The thesis uh page in the university for the previous students. So I would open four or five and see how they divide the sections for the chapter one, chapter two. So I use them as an example or template. (Clapeyron)

Examples of theses to give students a clear idea of the department's expectations may help students feel like thesis-writing is an approachable task. However, as discussed in the previous chapter, the potential downside of students using theses from previous semesters as examples is similarity in topic choice across multiple cohorts of students. One student also used the introduction sections of articles they were citing as models for the structure of their thesis introduction. This approach aligns with trends in academic writing pedagogy. Having an understanding of the organizational patterns in source texts can help students produce organized compositions (Grabe & Zhang, 2016). Furthermore, using genre-based writing tasks that include

genre-specific examples have been shown to be effective in increasing second language learners' genre awareness (Yasuda, 2011). By finding example texts to analyze before starting writing tasks for respiratory therapy courses, the students might achieve a similar result.

6.4 Drafting Skills

Students also developed skills for drafting. Five out of ten student interviewees mentioned preferring to draft loosely organized collections of thoughts initially and organize them later. An example of this strategy is described below:

> At the beginning? Just I write, everything comes to my mind. When I write, for example, when I read an information in a paper, I just write it down, not in academic, just I write down what I would say. Not very formal, just, but then later, that's where the challenge begins when I try to take these words and put it in an academic form. (Wama)

Although the students felt like this strategy was helpful for them, to evaluate whether it eventually resulted in organized compositions, it would be necessary to collect texts that they wrote with this strategy. In contrast to the loose drafting strategy, four of the students interviewed described outlining skills that helped their academic writing.

> Well, first all, I do a schedule and organize the thing that I want to do. And in this schedule, I put all papers that I finalize that I will be using them in my paper and just take the information from each one and just put it in front of it. So I rely on tables so I don't have to go randomly twenty paper and just take, no, I don't use this way. (MB)

> I started by first headlines and how many paragraphs do I need in this chapter, and I divide them, like the purpose of the study, the significance, the introduction part, the long

> paragraph that summarize the whole study, and as--like that, like a pinpoint, and then I started to write it. (Avogadro)

By creating an outline, students started their theses with a plan to guide the progression of ideas. There is some evidence that both approaches used by participants (writing then re-writing or outlining before writing) could be somewhat effective, but outlining may lead to higher quality drafts (Galbraith & Torrance, 2004). Examining writing from students who drafted organized notes and disorganized sentences before producing a final draft, Galbraith and Torrance (2004) found that the students who produced disorganized sentences as a rough draft made significant improvements in their final drafts, but the students who produced organized notes in the first draft had higher-quality final drafts than those who initially drafted disorganized sentences. An in-between strategy of writing organized sentences in the first draft led to better final drafts than writing disorganized sentences in the first draft, but not as good as outlining organized notes in the first draft. Based on these findings, although some students prefer to start with loosely organized drafts, and they may be able to make them more organized later, outlining before writing may be a more promising strategy.

6.5 Time Management

Time management skills were also seen as important for students' writing success. Reading and writing were time-consuming for some participants, but starting large writing projects early allowed students to take the time that they felt was needed. The role of time management was also noted in Odena and Burgess's (2017) study on how graduate students navigate the thesis-writing process. The respiratory therapy program observed helped students with time management by integrating thesis draft deadlines into courses. An introduction draft was due in one course, and a literature review draft was due in another course. A student who

enjoyed the thesis writing process mentioned, "…I started to work on my thesis too early and that's really helpful a lot, a lot" (Mike). Some of the student interviewees using English as an additional language felt that their reading and writing speed was slower in English than in their first language, which may have motivated them to allow themselves ample writing time. However, even the participant who used English as a first language thought it was important to start projects in unfamiliar genres early to ensure plenty of writing time. When they wrote an annotated bibliography for the first time, they started very early to allow time to ask for feedback before the final draft was due. When they started a thesis, they started early because the idea of writing a thesis seemed intimidating. While time management is not a linguistic skill, it could be viewed as a writing strategy and a way to counter-balance challenges with writing speed and taking time to learn new genres. There is, however, a possible connection between proficiency level and how writers allocate time to each piece of the writing process. Roca de Larios et al. (2008) found that second language writers at higher proficiency levels balance their time between planning, formulating, revising, and doing other pieces of the writing process more evenly as proficiency increases, with more time allotted to planning at higher proficiency levels. Starting writing projects early may help students have time for each of the processes.

6.6 Thesis Support Seminar and Thesis Progress in Other Courses

The department's writing support seminar allows master's students to start their theses or projects under the guidance of the course instructor. In the observations of the writing support class sessions, information about the type of writing projects students undertake, scaffolding approaches that instructors use, peer-support that students receive, and discussions that happen throughout the writing processes were noted. Some forms of writing scaffolding that were noted included providing students with access to theses to read as examples, sharing links for citation

help, discussing topic ideas, discussing content, recommending reading materials, connecting students to other faculty or other researchers who work in their area of interest, giving feedback, and encouraging support from classmates. The course helped students start their theses or projects.

Thesis Support Seminar Synchronous Session 1

The first synchronous session was approximately two hours. The instructor discussed the project that the students would be working on throughout the summer. Students could choose to complete the first chapter of a thesis, introduction to the written report of a practical project, or a complete protocol for providing care for patients with specified conditions. The protocol option was encouraged for students working in a hospital that could benefit from a protocol, and the practical project was encouraged for students in the "integrated master's" program taking undergraduate and master's courses.

After friendly introductions, the instructor talked to the students about citing sources. They recommended that students obtain a copy of the APA manual, and noted that some places where their papers are published use APA and others use MLA. The APA manual was considered a required course textbook for students writing a thesis. The professor also discussed the quality of sources cited, and generally advised students to cite peer-reviewed journal articles that were written within the last five years, unless they need to cite groundbreaking findings that are older. They recommended utilizing citation software, such as Endnote or Zotero. The instructor showed students where to find information about downloading citation software through university subscriptions on the e-learning platform, and explained that Zotero is free even after students graduate. They also showed students where to find theses written by students

who were previously in the department, which could be used as examples of formatting, and noted that Microsoft Word can automatically generate a table of contents.

From there, the instructor transitioned into overviewing the chapters of a thesis. A student asked about the length requirement for chapter 1, and the instructor responded that there is not a minimum and the appropriate length really depends on the topic. They noted that chapter two, the literature review chapter, is often the longest chapter, and for some students "the most boring." They described the information in chapter two as moving from broad to narrow foci.

The instructor then gave students a tour of the scaffolding resources available on the course page of the university's learning management system. The instructor included an outline of the organizational structure of theses, guidelines for the defense of the thesis, project, or protocol (the students would practice presenting on their writing at the end of the course in preparation for the defense at the end of their program), PowerPoints, online writing resources (such as Purdue University's Online Writing Lab), and a list of transition words. In informal conversations with respiratory therapy faculty, some instructors had mentioned that many students using English as an additional language rely too heavily on a few transition words and phrases, which could be a reason for providing the list. There were also resources available for students writing about practical projects, including an 8-9 page document describing the project option.

The instructor encouraged the students to make a goal of presenting what they would be working on at a conference, such as the American Association of Respiratory Care International Congress. They also listed a few ideas for protocols, and encouraged students to think about what procedures would be conducted more efficiently in their hospitals if there were protocols outlining the steps. A student asked about the minimum number of articles they would need to

cite for the literature review section, and the instructor responded that there is not a set minimum but around five to ten would be enough for a protocol. They explained that it depends on how much research on the topic is available. Topics that are under-researched may have fewer citable findings, but related information could be cited.

Thesis Support Seminar Synchronous Sessions 2 and 3

In the second and third session observed, the instructor took a student-centered approach, inviting each student to talk to the group about the writing project they were doing. Students who had not settled on a project idea discussed the options they were considering with the class and or asked about possible ideas. The instructor provided a student who had not decided on a topic with reading materials about the topics they were considering. Many of the students writing protocols took the instructor's advice to consider what would be helpful in the hospitals where they worked, and they shared why they thought their hospital needed the protocol they were writing. The instructor encouraged these ideas, mentioning research on how much protocols can increase efficiency in hospitals. As students were sharing their ideas, the instructor commented on each project with content-related suggestions. For example, one student mentioned considering using survey methods in a thesis. The professor recommended looking for a published survey to use or modify after obtaining authors' permission. This suggestion aligns with other professors' comments about students' difficulty with writing valid surveys and the preference in the field to use published, validated surveys. Because the students work in different hospitals and have different interests, the students also offered each other suggestions and resources verbally or in the chat. For example, for students writing protocols, the instructor encouraged avoiding "re-inventing the wheel" by referencing ideas from protocols that other

hospitals were using, and some students offered to share protocols that they knew about that could inform their classmates' projects.

Some international students chose to write about how to use tools or procedures that were more commonly used in the US than they were in the hospital where they worked in their home countries or procedures that were not extensively covered in their undergraduate-level training outside the US. The students from different countries compared the equipment options that were available to them, and the instructor recommended faculty members to talk to discuss the use of specific tools.

For some students doing projects to educate patients, the teacher suggested multimodal writing to increase the accessibility of information for patients. They explained that they would still need to submit a written document for the course introducing the project, but videos could be a good option for some topics. For multimodal project ideas requiring advanced technology skills, such as creating virtual reality patient education materials, the instructor clarified that students could collaborate with someone outside the department to help with technology components of their projects, as long as the collaboration was acknowledged in the written report. Students recommended acquaintances they knew who could help with specific forms of technology for their classmates' multimodal project ideas in the chat.

Thesis Support Seminar Synchronous Session 4 and 5

In the fourth and fifth synchronous sessions, students presented their progress on their theses or projects. For the course, the research or projects did not yet need to be complete, so students shared the background informing the idea and the plan for implementation. The professor started by encouraging students not to stress about their presentations and reassuring them that they know a lot about their topics. They also reassured students that they could be free

to admit if they did not know the answer to a question in the Q&A portion of the presentation. The professor also encouraged students to aim to publish their theses, explaining that they would not have to add anything, but rather shorten what they have in their thesis to about 3,000 words.

Every student gave a presentation about their work sharing their screen. The professor commented on each presentation, offered suggestions, mentioned other researchers who students could connect with, recommended sources to reference, shared insight relating to practice, asked questions, and encouraged students about the usefulness of their projects. One student was working on a systematic review for a thesis, and the instructor took the opportunity to explain to the class the difference between systematic reviews and meta-analyses. They compared systematic reviews to the literature review chapter of empirical theses, explaining, "Basically you can think of what [student name] is doing as a big, fat chapter 2... Godzilla size." Students also offered each other suggestions in the chat, such as recommendations for writing materials in IRB applications.

Students' Comments on the Thesis Support Seminar

A few interviewees mentioned the writing support seminar when discussing the ways to overcome the challenges of writing a thesis. One student described how the course was helpful for choosing between two thesis topic ideas, one that was related to a lot of previous literature, and another that was not:

> At that time, luckily my supervisor was teaching that class, so I spoke with him about, I have doubts and I'm nervous about it because I didn't find more than like three or five articles. And so we changed it to this topic and easily, I could find, I found more than three 30 to 50, but most of them it was about the adult population. And my focus, I was

> focusing, I was focusing in the pediatric and the neonatal population. So it was a little bit hard, but I found a couple of articles that. (Avogadro)

Talking to the course instructor helped them decide on the topic and move forward with their plans. Another student described how the course helped them make progress on their thesis:

> I kind of built up momentum and I actually did a substantial amount of research and created a first draft before the fall semester started, and then worked to get that polished up and had the narrative part of the paper due. (Weston)

By taking the course, students have some guidance as they get started on their theses or projects.

Scaffolding Activities to Work towards Research Writing

To work towards a thesis or project and learn about research writing, students are given assignments relating to their research. Annotated bibliographies, which allow students to read about the topics that are relevant to their theses or projects and find sources that they could cite in their literature review sections, are commonly assigned. Instructors use the opportunity to give feedback about the source selection and how well the student summarized the sources. Other examples of assignments working towards a thesis or project include article critiques, position papers (supporting a stance with research), and clinical practice guideline critiques. Clinical practice guideline critiques are used to help students connect the literature that they have read for their thesis or project to issues in practice:

> Now that you've gone through, you've learned how to parse through these articles, read them, comprehend them, you've had some guidance on that, now show me that you can take that and apply it to something that goes along with what we're talking about. And again, if there's something that they're already thinking about for their thesis or something like that, a lot of times I try and guide them. If there's a CPG that kind of goes along with

> that, it's a really great opportunity. You can be kind of doing double work essentially. (Prof. Smith)

Some assignments also help students learn about writing research papers without requiring them to write a full research paper. For example, for some classes, students write papers about interview findings that are shorter than a full research paper, such as a miniature ethnography paper for an intercultural communication course. In the statistics course, students practice writing methods and results for statistical tests that they learn. These assignments can help students build research-writing skills. For one student, the non-thesis assignments were also helpful for establishing a writing routine:

> …I had two other 50-to-60-page papers in the master's programs as part of other classroom assignments that I had to do, and I use roughly the same process for each. So this [the thesis] wasn't one-off I've had now a couple of iterations like this… (Weston)

Some student interviewees who generally found writing to be difficult also mentioned that topic familiarity affects the ease of the writing process. By completing assignments related to the thesis topic, students can also build their familiarity with their topic. Topic familiarity has been linked to writing longer texts at a faster pace with more revision (Li & Yu, 2023). Building knowledge of the thesis topic through course assignments may lead to a smooth thesis-writing experience.

6.7 Feedback

A major form of academic literacy support for international respiratory therapy master's students is feedback from instructors. 15 out of 31 survey respondents indicated that they sought help from advisors or other instructors to help them overcome writing challenges. Four of the interviewed students also mentioned their professors' feedback in their revision processes. One

interviewee mentioned that their professor helped, “not only in language, even in ideas. She helped me in idea. She helped me in arrange, how can I arrange it” (Fatin).

Most of the instructors interviewed do not explicitly teach writing skills in their respiratory therapy classes, but all of the professors interviewed described giving students individual writing help through feedback. Instructors interviewed described providing feedback on content, methodological choices, intelligibility and clarity, organization and cohesion, grammar (commas, sentence structure, prepositions, word order), academic style, and word choice. The methods of feedback described by instructors generally consisted of comments on the students’ drafts, corrections with track changes, highlighting errors, and meetings (discussed below). Many professors break assignments into smaller parts to provide feedback on multiple stages of the writing process. As one professor described, “…what I do is I try to provide milestones throughout the course since like you know develop your research question, and then I provide feedback on the writing throughout the class and try to help them improve through feedback” (Prof. Clausius). For annotated bibliography assignments, Professor Smith described giving students feedback on one annotation and source selection before they proceed to write the rest of the annotated bibliography, with the option of turning in other rough drafts after adding more annotations. Other professors also described giving students options for early feedback on drafts. Professor Wright explained, “I'm not one of those individuals that says, ‘Hey, if you turn it in early, I won't look at it till the due date.’ I'm not that person.” A student also described getting support from professors on early drafts:

> I think in each of the three big papers I had to do, the professors volunteered to look at early drafts. So somewhere along the line there, after I've had a first or second draft, I'd

> send it in, look for comments, and then incorporate those comments on the way to a final version. (Weston)

However, although it seems that feedback is generally offered, one professor mentioned that there are some students who do not make improvements based on professors' feedback. They explained, "So even with my feedback, there's no improvement, if that makes sense. The second draft is similar to the first draft and I can tell that they didn't take my advice…" (Prof. Charles). The professors offer suggestions, but it is in the hands of the students to make revisions based on the suggestions offered. The professor quoted above had the impression that more successful students tend to display better feedback uptake. Research on writing feedback for graduate students writing in a second language has generally found that students pay attention to feedback from instructors and make effective revisions (Cheng et al., 2025). Though the instructors have noticed some students who are not benefitting from feedback, the student participants in this study found instructor feedback to be helpful.

Time Consuming

The instructors who were interviewed spent a lot of time giving students writing feedback. Because of time limitations, many of them preferred if students sought language-related help from other sources so that they focus their extensive feedback time on the content that they teach. For students at lower English writing proficiency levels, it is possible for language-related errors to interfere with the intelligibility of their writing, which may affect the content-related feedback that instructors can provide, as seen in the quote below:

> …we spend so much time even just like trying to read through their manuscript sometimes, just trying to figure out what are they trying to say. Even that part of it becomes time consuming um, you know and helping to give them direction. That's why

> we again like try and lean so heavily on outside resources for them as well, is like you know take that time outside of this, that by the time you get here we can really talk about content. (Prof. Smith)

However, even the professors interviewed who really preferred to focus on content-related feedback provided feedback on grammar as well. Two of the professors interviewed addressed this time conflict at times by requiring students to seek outside help to fix grammatical mistakes if they saw too many errors in the first one-two pages, as seen in the quote below from a professor who taught courses with 300 students in addition to the smaller master's classes:

> …if the grammar is just really terrible, I may only read the first page of it and say, I've gotten to this point. This entire paper needs to be revised for grammar. You need to send this to somebody or go to the writing lab and help them or have them help you rewrite this because I don't have enough time to go through the entire paper line by line and correct every sentence. So if it is really terrible, I will just read the first page of it and then say, you've got to rewrite this whole thing for grammar. (Prof. Clausius)

Although there are not objective criteria differentiating acceptable and "really terrible" grammar, the one-page feedback approach may push students to seek help with grammar, and it allows them to submit assignments for feedback a second time after they have hopefully learned through the revision process. One of the professors who set limits on language-related feedback had many students, and providing language-related feedback seemed to them like an unrealistic option:

> So we do provide the resources necessary, but we don't have the time. I mean, I manage 150 students and I teach three to four in-person lectures a semester and an online course, and I have to chair projects and thesis. So there's just no time for me to be able to go

> through individually with every student and help them with their writing along the way. So we do it, we utilize the resources from the university. (Prof. Charles)

Both professors quoted above limiting the grammatical feedback described providing extensive content-related feedback on student assignments, as well as language-related feedback in limited amounts.

Hesitancy to Teach Language-Related Skills

In spite of the extensive language support that respiratory therapy instructors described providing, in addition to the desire to focus on content-related feedback, four of the instructors interviewed felt like they were not an ideal source of language-related feedback. The reasons given were that teaching English language skills is not a part of their job and that they felt like they were not qualified to teach language skills with no language pedagogy training. For example, in the quotes below, one professor describes editing student work as outside the scope of their job as a respiratory therapy instructor, and the other describes their lack of qualification to teach English:

> I give what I call a summary of what I would do versus change this and change this. 'Cause I'm not an editor and I don't feel that's my position to be as uh their professor. I'm not their editor. It's two different pieces. So I give them this is what I, this I would correct. (Prof. Wright)

> Like we can help you to an extent with that, but like that's not, like I'm not qualified to do that. You know to an extent I'm not an English professor, I do not teach English as a second language. (Prof. Smith)

Professor Smith described wanting to explain the reasons for grammatical corrections on students' papers so that they could learn from the feedback, but not always knowing how to explain the grammatical rules behind the corrections. The instructors doubting their ability to help students with writing are published authors, and students interviewed claim to benefit from the instructors' language-related writing feedback in general, but the feeling of lack of expertise in language pedagogy seemed to affect their confidence in providing language-related corrections. The respiratory therapy instructors' focus on content-related feedback over language-related feedback aligns with Hyland's (2013) findings on what type of feedback is given to second language writers in hard science courses. In both Hyland's (2013) study and the current study, some disciplinary instructors felt like language-related feedback was not a part of their job. For second language development, feedback on content and language has been found to be more effective than feedback on language alone (Biber et al., 2011). Although second language development is not respiratory therapy instructors' main focus, if students receive content-related feedback from their instructors with some language-related suggestions, it could be beneficial.

Topic Choice Guidance

Students in the department observed are required to select their thesis topic, but they receive extensive support for refining their decisions (see the comments in the previous chapter on topic choice challenges) in the research seminar when they start their thesis or project introduction section and in other classes working on related topics. Students are encouraged to use their thesis or project topic for annotated bibliography assignments, for example, to read sources that will help them reach their goals, and instructors can provide feedback if the scope of

the annotated bibliography topic is too broad. Annotated bibliographies are also used to help students who have not decided on a topic read about possible options:

> …anytime there's an annotated bibliography assignment due and a course that I teach, I, um, really kind of push my students to use that as an opportunity to, if they haven't picked a topic for their dissertation yet, I'm sorry for their thesis yet, use that as an opportunity to explore different topics, right? Like, if you're doing an annotated bib, if you have a couple of different assignments, do their annotated bibs, use one to explore one topic you think you think might be interesting, use another to explore another topic. And, you know, use that as an opportunity to figure out what you find interesting and what you don't find interesting. (McConaughey)

Through the seminar course and all the assignments building towards a thesis or project, students have many opportunities to discuss their topic ideas with faculty members. Research on PhD students' process of selecting dissertation topics has found that the courses in the program and input from their advisors can guide their choices (Xia, 2013), and it is reasonable to assume that the same trend could be found among master's students. Xia (2013) describes topic choice as being influenced by students' socialization into their disciplines throughout their program.

6.8 Meetings for Reading and Writing Help

One of the ways that respiratory therapy instructors help students with language-related feedback is through individual meetings. Since each student could have different areas for improvement, and class time is taken by instruction related to respiratory therapy content rather than language, instructors prefer to have individual meetings with students needing language-related support. One professor described that one-on-one meetings seem to be the most effective way of offering language-related support:

> …we have so many office hour scheduled for students so that we can meet with them one-on-one to clarify any issues that they have. And that seems to work very well. But yes, absolutely there's a barrier there for sure. But we've learned, we've had a relationship with different international students… we have a lot of international students come through our program, and so we have a lot of experience with them. So we kind of trialed what works for the students. And what really works is just those one-on-one meetings… we have an open-door policy in our department, so we pretty much every day that we're on campus, we block out a certain amount of time for students to come meet with us. (Prof. Charles)

Professor Charles, quoted above, uses one-on-one meetings to discuss organization in writing and how to communicate students' ideas through writing. In previous literature, graduate students writing in a second language have found individual meetings to be helpful for identifying areas of writing to improve, improving English skills in general, and feeling more confident about writing (Ma, 2019). In line with Hirano's (2014) findings on support for multilingual writers, the professors in the observed department try to make themselves available to meet with students. In addition to meetings for course assignments, students writing theses have meetings with their committee before their defense to discuss their recommended revisions.

14 out of 31 survey respondents indicated that they talked to instructors about texts they were reading when they encountered reading challenges. Individual meetings were used for reading support in cases of evidence of reading comprehension challenges:

> …usually I'll meet,… 'n be like, 'Hey, let's pick an article and let's practice going through this. Can you tell me the big points of it?' … a lot of the like explicit teaching is going to be more one-on-one. (Prof. Smith)

Meetings to discuss reading were one strategy for instructors to help students displaying reading comprehension gaps in their annotated bibliography entries. By discussing texts with students, instructors could identify areas of misunderstanding to address. Ideally, by comparing misunderstandings with instructors' explanations, students would be able to learn what they needed to know to understand the text.

6.9 Help with Organization

Respiratory therapy professors interviewed helped students learn about writing organized compositions. The department's master's handbook provides instructions for the type of information that should be included in each thesis chapter, and as noted above, professors showed students how to access examples of theses from previous semesters to use as references. In the course that helps students write the first two chapters of a thesis, the instructor also explains the expectations for organization. One professor interviewed has encouraged students to outline in pre-writing phases:

> I tell all of my students who are I'm advising, you've got to outline. You've got to outline it. That's because if you can outline it and you can outline it in a manner that makes sense, writing it then becomes very, very straightforward. But if you don't try to write from an outline, it becomes very difficult, especially in chapter three, the methodology to go through and be able to explain this is what I'm doing… (Prof. Wright)

For a student interviewee who had difficulty with outlining papers in English, speaking to another professor about outlining was extremely helpful for getting started on a writing project:

> I mean, before I meet him, I was suffering from that because how I start? What I will do? What should I do for him to address him, let's say to write something ideal. Once I meet him, I remember he just give me the outline, the first section like this, second section

> write about this, the third section about this. That's it. He just give me the idea. The first section is the introduction and why. Yeah, the introduction about sleep, just introduction, the second section about diseases, the third section, what is your purpose? Once he gave me this, I mean it was just a blink. I did it in a very easy way, in a very fast way because I know what's the idea. I know what he want. I have a ground to start with. Yeah, I have the skeletal, let's say, as you say. (Amonton)

Professors also provide extensive feedback on organization and cohesion of assignments in general, as seen in the quote below:

> So we spend most of our time with our grad students in their writing, just helping them organize their thoughts so that at least the material and the content is clear in their heads on what they want to display in their writing. We don't have time to sit there and go through all what an English composition course would go through, if that makes sense. (Prof. Charles)

When a students' intended organizational pattern of an assignment submission is not clear, multiple professors mentioned that talking with students to understand the progression that they intended can be helpful. After understanding the connections between ideas that students had in mind, the professors talk about how to sequence the ideas in the text. Hyland (2013) also noted that logical sequence of ideas was a common focus in instructor feedback in courses that are not English courses.

6.10 Help with Publishing

Respiratory therapy instructors also described helping students revise their writing to submit it for publication. For example, when students finish the master's program, they can work with their committee or advisors to try to publish their thesis. The process of revising students'

work to meet journals' expectations involves extensive support from professors, as described in the quote below:

> When working with students, I find that we are very heavily involved in composing or directing them how to compose it because they have no idea of a) the technical writing they need to have and b) what the—how to put the material together in a format that will be accepted. And a lot of that's just due to an experience issue first. And then secondarily, maybe writing skills. (Prof. Wright)

By working with experienced professors, students can learn more about expectations for academic writing, even after they defend their thesis and graduate. One student who was interviewed started their thesis in advance specifically to make sure there was time to write a publishable composition:

> I started much, much earlier than them, yeah, so because I'm planning to publish this paper, so I started sooner than later just making sure I'm doing things in a great way 'cause I believe two semesters it's not much sufficient to work on a papers writing chapter one, chapter two, and if I have plan to publish that papers, so it's not sufficient at all. So that was my plan to start earlier and sooner than later. (Mike)

Another student (recent graduate) interviewee mentioned that their committee offered to help them publish their thesis and they were very encouraging, but at the time of the interview, the student had not yet taken their offer.

6.11 Support from Outside the Department

Respiratory therapy instructors heavily encourage the use of writing support offered outside of the department. Professors referred students to other units in the university and online

sources outside of the university that could help them improve their drafts. Professors were very confident in the resources that they recommended:

> …the greatest result that we've seen is utilizing all the resources out there and seeking assistance. And then we see a dramatic difference when students don't listen to our advice and they don't seek these resources and assistance, it becomes very time consuming for me to have to go and critique their writing because it's literally every sentence. (Prof. Charles)

By referring students to outside forms of writing support, respiratory therapy instructors can focus their efforts on helping students with the content related to their field.

Writing Studio

Referral to the university writing studio was a major theme in the faculty interviews. All of the professors interviewed made reference to the university writing studio, where graduate students can sign up for one-on-one writing consultation meetings that last up to 55 minutes with graduate students from the university's English department. The writing studio also offers electronic handouts with information about academic writing (how to write an abstract, how to write a literature review, etc.). Some professors seemed to have the general belief that the writing center had tutors who were more qualified to teach students about writing than themselves.

> … I've had conversations with students who have wanted to come meet with me and they have asked me to teach them the when to use quotation marks versus paraphrasing them. And as I tell them, I said, 'That's, that really isn't my position to do and we don't have the time nor do I have the expertise to do that.' And we refer them to the I think it's the writing support piece up there to be able to do that. (Prof. Wright)

Another professor explained, “But we do direct them a lot to the writing lab here on campus, just saying like, there are people that like specialize in this, like that that's their job is to help you with something like this” (Prof. Smith). The professors interviewed told students about the writing studio individually when they thought that they could benefit from writing studio services, and some students may choose to make appointments without professors individually encouraging them to go. The professors believed that the assignment drafts they read that had already been revised with support from the writing studio had a higher quality of writing than those that had not been reviewed by the writing studio, and the better writing quality helped them focus their feedback on content.

In spite of the popularity of the writing studio among faculty members, only six out of 31 survey respondents indicated that they used the writing studio. Out of those six, five indicated that it was helpful for them, and one did not answer the question about whether it was helpful. None of the student interview participants visited the writing studio during their master’s studies, but three went to a university writing center at some point before starting their master’s program. Out of these three students, one found it to be helpful for grammar, while others only found it to be somewhat helpful. As one student described,

> It is just to go over the sentence. I would be like, oh, this is wrong. You can change it to this and this. So, you'll change it. I mean, if the one if the person is caring about to improve his writing, yeah you will learn from them. But sometimes I just don't want to lie. I go to them just to check my research or my essay or anything just to go over and let me know what's the thing I need to change or to just have a perfect paper more than learn. (Cannizzaro)

However, this impression was based on the experience of visiting a writing center at a university that the participant was not attending for graduate studies. One interviewee had plans to go to the writing studio in the future, and another mentioned that they have good resources, even though they had not had writing studio appointments. However, one student went to writing workshops that they thought may have been hosted by the writing studio:

> So they have a writing workshop for almost four days. I used to enroll in those writing workshops and I can see I set every day my goals, what I want to achieve in terms of reading and writing and that was really helpful a lot… They have plenty of grad students helping other grad students in terms of looking to their writings and giving them tips, suggestions, advices, how to modify their writings… And not this only as well, like many librarians, different resources, like people who have a background with data analysis, people who have a background with Zotero, Endnote, I am sure you're familiar with those things, how to search in a professional way, looking for different articles.

The student had good experiences in the workshops, but had not yet gone to the writing studio nonetheless. Although writing studio attendance rates appear to be low among the participants, faculty members' recommendations for students to go are supported by previous literature. In a survey including students using English as a first and additional language at multiple universities (public and private), students, regardless of their background in English, indicated satisfaction with their experiences at university writing centers and desire to repeat their visits (Bromley et al., 2018). It may be worthwhile for respiratory therapy professors to continue their efforts to encourage students to go to the university writing studio.

Librarians

In the university that participants attend, each department is assigned a librarian to assist students. In the respiratory therapy department, students were introduced to the librarian in one of their courses, and they were encouraged to make appointments with them to learn about finding academic sources:

> …one of the things that I do early on as well is make sure that they go see the research librarian. So our research librarian is [name], and so they go, I give them [librarian's name]'s email, they get with [librarian's name], they go through how to start using all the different resources at the library to be able to go through and start doing some different findings of some of their ideas to see is their idea already been done? Is there something we can change about it? What that might be, getting them to again, think a little bit more. And so hopefully that again, goes to their library skills that they're learning, but also will then go into their reading skills because they're going to have to do a reading of all these different pieces of literature that come up so that they can try to hopefully get a sense of what it is that they're doing. They're on track or they need to shift or totally change altogether. (Prof. Boyles)

The librarians can help students find academic sources efficiently. One student interviewee who was writing a systematic review mentioned finding meetings with the librarian to be very helpful:

> Well, I got a suggest- advice from my director looking to one of our librarians. We have one of our librarians, he's specialized with more health articles, more health topics. So I used to meet him couple of times and he taught me how to search in a professional way, how to use certain databases related to our profession in the health field. And that was

> helpful a lot. And I used to meet him from time to time if I have any question. And he's really supportive. So I realize it's not searching in a Google about certain topics, certain article, no, there are certain databases and it's actually, it's a good resources that [university name] providing all of those resources to grad students as well for undergrad students. (Mike)

For writing a systematic review, finding sources is essential, so the librarian could provide Mike with very useful information. Another student interviewee, who had limited previous experience searching for academic sources, described meetings with the librarian as "terrifically helpful." By learning from the librarian how to find academic sources efficiently, students can spend more time reading the sources that will help them with their writing projects.

Editing and Tutoring

Some professors also recommend that students find tutors or editors outside of the university to help with writing. Some of the professors hoped to find a graduate student who students could be referred to for editing. One professor also recommended some students to find a tutor to help them develop writing skills, explaining, "…from the draft, if there is a problem, I will start to basically advise them and sway them towards mentorship in writing, any sort of tutoring…" (Charles). The student participants, however, did not mention any editors or tutors during their master's studies. For editing, they turned to electronic resources rather than human editors. In a case study, Hirano (2014) found that when multilingual students were assigned writing tutors by the university, they met with they benefited from meeting with them. It may be worth investigating whether respiratory therapy graduate students would be more likely to seek help from writing tutors if they were referred to an assigned tutor.

Electronic Resources

Faculty also referred students to electronic resources for writing. 21 out of 31 survey respondents indicated that they used electronic resources to help with writing challenges. Electronic resources were also used for reading support. 17 out of 31 survey respondents indicated that when they faced challenges reading a text, they looked for other sources of information on the same topic. Interview data provided more details about the types of electronic resources and ways that they are used.

6.11.1.1 Tools for Finding Academic Sources

To find academic sources to read and cite, students were referred to PubMed, the university library catalogue, and Google Scholar. The students interviewed found PubMed to be especially helpful. One interviewee preferred CINAHL and PubMed because of the ease of searching multiple topics at the same time using *and* or *or* between search terms. In contrast, another interviewee preferred Google Scholar because of the ease of limiting the search to specific years. One interviewee also used a database from the library at the hospital where they worked in their home country and found it to be more user friendly than the university library website and easy for accessing sources that were available through hospital subscriptions. Only one participant mentioned using AI tools to find academic sources:

> This the Perplexity, for example, I will write sleep disorder. He will give me seven to eight to 10 research speaking about sleep disorder, and he will just give me, let's say a statement or some of the ideas in these researches. (Amonton)

Based on the interviewees' descriptions of their search engine use, it seems that convenience is a factor in the search engine choice, but each participant prioritizes different searching convenience features. As noted above, the university librarian assigned to the

respiratory therapy department helps students learn about how to use the databases that are available.

6.11.1.2 AI Tools for Paraphrasing

Student participants also utilized generative AI paraphrasing tools. One participant used them for reading support, while other participants used them for writing support. For reading, the student utilized Chat GPT and Explain Paper to simplify entire texts and individual sentences into terms that were easier to understand. Sometimes they also used Chat GPT-generated simplified summaries to decide whether to read full articles, similar to Amonton's use of Perplexity. Wama explained, "…it can be easier to get an idea about the article. If I find it interesting, I'll just read it. It's like the abstract, you know?" Theoretically, reading simplified texts may be helpful for accessing second language input that is comprehensible for the students' current reading level, if the reading level of the simplifications is gradually adjusted as students progress in their reading proficiency. However, the participant was not adjusting the difficulty level of the simplification over time. It is possible though that Chat GPT's simplified summaries could help the participant start the more complicated text with background knowledge about the topic. Since topic familiarity is associated with increased L2 reading comprehension (Leeser, 2007), building an understanding of the main ideas of a text before reading it could be a helpful strategy.

Generative AI tools were more commonly mentioned by participants as writing support, especially for paraphrasing. Some interviewees utilized Quillbot and Chat GPT for paraphrasing, and one participant used Grammarly's paraphrasing function. Some participants felt more confident about their academic tone when using paraphrasing tools. As one participant described, "It's for paraphrase website, but sometimes this is what I do. I paraphrase my own words or my

own sentence. So it becomes more clear or more academic if I may" (Clapeyron). For students who have trouble putting their ideas into words, the paraphrasing tools may alleviate the feeling of writer's block. One participant compared the paraphrasing tools to extra brains thinking about how to word ideas:

> Let's say I will write about sleep apnea. Yeah, a breathing disorder in which you stop breathing for ten second or more during sleep. Then I will just paraphrase it in Chat GPT then Chat GPT will give me another statement. The Quill Bot will give me another statement. I have in myself another statement. I have also the statement that I have read already, so right now I have four ideas. I just read four brains thinking, each brain giving idea and all these, let's say I have four pictures in my brain, which I believe it's giving me a skeletal for English, and also I can modify it in another way, or let's say I can merge between two things to have better tone, to have better English... nowadays, if I want to write something, I'm not feeling, let's say nervous or difficult like before. (Amonton)

The additional "brains" make writing tasks more approachable from Amonton's perspective. The students utilizing paraphrasing tools clarified that they were not taking text directly from the output, but rather modifying it in their own words:

> Well, I just read the original paper and I read what Chat GPT gave me, and then just I put my own idea, so I don't take what Chat GPT literally say and just put it on my paper because that's considered as a cheating, I think. (MB)

In addition to paraphrasing help, one participant used Chat GPT as a sentence structure guide, asking for a sentence about a different topic than what they wanted to write about, and then using the same structure as the output with replaced words.

It is not clear how the availability of paraphrasing tools will affect academic writing pedagogy in the future. One of the faculty participants was already seeing changes in views of paraphrasing. In their words, “Paraphrasing is a skill that's going the way of the dodo as far as I'm concerned…” (Prof. Wright). The student interviewees, however, still felt a need to paraphrase the paraphrased output of generative AI tools. It could be helpful for future studies to explore whether language learners’ paraphrases of AI tool’s paraphrases of their own sentences lead to higher writing quality than language learners’ sentences produced without AI support.

Although the students feel like they are benefitting from using generative AI tools for paraphrasing, there are currently potential risks to their approaches, and some students were mindful of these risks:

1. It is possible that AI-generated writing may not be perceived favorably by all of students’ readers. If students do not make sufficient changes when paraphrasing the output from AI generated text, their assignments may be marked for AI content by the university’s plagiarism and AI detection software. A student participant mentioned knowing that one professor did not mind if students used generative AI paraphrasing tools, but it would be important for students to consider all of their professors’ opinions. One student interviewee did not want to use generative AI tools because of the potential for negative impressions from professors:

> I heard even one time my professor was talking about Chat GPT here in our master class, and he said, ‘I would not find any of you having Chat GPT because one student had done this. And when I went over I found plagiarism more than 70% and I had to take an action with them.’ So I was like, no no no no, let me away from this way and just keep my way to do. And they're helpful. All of my

> professors and master's degree, they're helpful. They're available every time. (Cannizzaro)

Conversations in the academic community about AI usage in writing are still ongoing, and many universities require students who use AI tools for assignments to include a detailed acknowledgement of how the AI tools were used.

2. The quality and style of AI-generated writing may not always match the intended register. One student participant noticed, “But usually the paraphrasing, for example, Quill Bot or Chat GPT, it's going to be simple. And if it's simple, you will understand it and you will modify it” (Wama). Wama’s impressions align with S. Kim et al.’s (2023) findings that generative AI tools provided students with overly simplified explanations of discipline-specific topics. The users’ prompts and the tools’ training may affect the simplicity of the output. The style of AI generated text also differs from that of human writers (Berber Sardinha, 2024). On top of concerns about style, there are also concerns that some generative AI tools might not yet be ideal paraphrasers. Chanpradit et al. (2024) evaluated Quillbot’s paraphrasing strategies using Keck’s (2014) framework and found that it substituted synonyms and made “moderate” revision to the text, indicating that there was still room for improvement. Furthermore, if users ask a tool to paraphrase a sentence, the output might not necessarily connect smoothly to the rest of the sentences in the paragraph, unless the user includes larger pieces of text in the prompt. Depending on how students use the output, the cohesion between sentences could be negatively affected. With these considerations in mind, students would need to look at the output of paraphrasing tools critically when making modifications.

3. Currently, generative AI tools occasionally produce hallucinations or misinterpret texts. One student interviewee experienced these issues, but they knew enough about the topic to catch the mistake. They recalled, “And then I wrote this INO [inhaled nitric oxide] and Chat GPT, and he gave me another medication that's not even belonging to what I need. And he listed everything. I was like, what?” (Cannizzaro). When students ask generative AI tools to paraphrase text, there is a small risk of “context inconsistency faithfulness hallucinations” (L. Huang et al., 2025), or misrepresentation of what the original text stated. While this issue is rare, students using AI tools to simplify texts for reading support have a small risk of reading these occasional misrepresentations of the source text. When using AI tools for writing paraphrases, students would need to ensure that the output matches the message that they wanted to convey.

The risks listed above could be mitigated if students use the tools carefully with critical thinking. There is potential for AI tools to be helpful for learning second/additional language writing skills (Mizumoto, 2023). However, the way that language learners interact with AI tools may affect their learning success. Not surprisingly, there is some evidence that using AI tools to consume information passively is not as effective for language learning as using AI tools while engaging in higher-order thinking for a “deep” approach to learning (Wang et al., 2023). Theoretically, if the respiratory therapy students using AI paraphrasing tools analyze the output critically, they have a higher chance of language learning through the experience, while if they passively copy the output, they have a lower chance of language learning. Wama’s criticism of the AI-generated output and Amonton’s efforts to combine ideas from multiple tools could be signs of promising approaches, as they require active thinking skills.

6.11.1.3 Translation Tools

Some students utilize translation tools while reading and writing. While they were seen by interviewees as somewhat helpful, the interviewees noted that electronic translation tools were not perfect. Fatin explained, “It's, it's not works because it's like, it's not give you like what you, oh, what want, exactly. But you give you like an idea about the words.” Cannizzaro found Google Translate to be less useful, saying, “…if you do Google translation, it won't be helpful that much. And some sentences even would be messed up. It won't be understandable.” Electronic translation tools were described as being better for translating isolated words than full sentences. Google Translate fell into the category of translation tools that are better for individual words. In Wama’s opinion, “So when I translate a word, just one word, It's good. But when I translate a sentence, no, it's not.” Interviewees did not mention using any generative AI tools for translation. One interviewee shifted away from using translation tools, replacing them with tools for finding English synonyms as they felt their English proficiency increasing.

6.11.1.4 Grammarly

For grammatical revisions, Grammarly was very popular in the respiratory therapy department. Eight out of 10 of the student interviewees mentioned using Grammarly, and most of them had positive impressions of its usefulness. In Mike’s opinion, “…it's really helpful. Lifesaver.” Some of the student interviewees used Grammarly very regularly. Professors also recommended Grammarly for students, and some professors had such high confidence in Grammarly that they did not see grammar as a serious barrier to success in academic writing. Professor Charles explained, “Yeah the grammar is not that big of a deal because that's easily fixed and they'll use the software and click a button.” However, student interviewees indicated that the suggestions from Grammarly were not always perfect. Previous literature has reported

that language teachers noticed that Grammarly did not always address sentence structure, word form, and word choice (Koltovskaia, 2023), but it is possible that it may address them more as it continues to improve. Given the limitations of automated feedback, students had to rely on their own judgement when choosing to accept Grammarly's suggested revisions. Students mentioned that "Sometimes it [Grammarly] doesn't make sense" (Avogadro) and "…even Grammarly sometimes just mix up some sentences won't be understandable, but I usually go over them" (Cannizzaro). In spite of this caveat, students generally found Grammarly to be helpful, when combined with their own evaluations of the suggestions.

Some of the student interviewees described learning from the feedback that Grammarly provided. Corrective feedback from Grammarly can help students know what they need to learn, and the suggestions for revision or rewording can expose students to new forms.

> …Grammarly actually do suggestions sometimes for some words, instead of saying it this way, you have this way to say, yeah, and I see actually this is a way even of learning, even if I'm using Grammarly because it's just go back to my sentence and suggested me another word, and then I'm going to write again and I will remember the word that Grammarly suggested for me. (Cannizzaro)

Some interviewees felt like they were becoming less dependent on Grammarly over time because they were learning from the feedback on their previous mistakes. Even a simpler Grammar Check tool was seen by one participant as helpful for learning:

> So this is give me this was, I believe I can say it as a free teacher. It was a really free teacher, a free teacher for me. I don't need to bother anyone. I don't need to have to someone to read it. I have these tools, I can use it. It's helping me. Yes, you have two

> ways you can just depend on it. Just write for me and it'll write it for you and you can use it as a helper for you to improve yourself. (Amonton)

In line with Amonton's description, previous literature has indicated that L2 writers have varying levels of engagement with automated feedback. Some learners passively accept suggested corrections while other learners think about the suggestions more carefully, which could impact their ability to learn from the feedback, but their confidence in Grammarly's ability to provide valid corrections may impact their engagement level (Ranalli, 2021). Amonton's preference to learn from technology to avoid "bothering" anyone may explain why students appear to prefer electronic resources over the writing studio, tutors, or editors. In addition to this perceived benefit, the electronic tools can provide instant feedback. Students do not have to schedule appointments or wait long for feedback from Grammarly and other electronic tools. According to systematic review of research on automated writing feedback, studies have found mixed results regarding learners' preferences for human or automated feedback (H. Shi & Aryadoust, 2024). It is possible that participants in this study were more likely to adopt automated grammar feedback because of their professors' recommendations.

6.11.1.5 Citation Software

For citation help, students were referred to Purdue University's Online Writing Lab (OWL) and citation software (Endnote, Zotero), but the participants generally preferred citation software over Purdue OWL. Although students are instructed to get a copy of a citation manual in the writing support seminar, only one student participant mentioned using a citation book. The students seemed to prefer the ease automatically generated citations. As one participant stated when asked about citation software, "…it's going to make your life way easier" (Avogadro). Some participants also copied citations from the search engines that they were using to find

academic sources, like PubMed. Citation softwares, however, have the advantage of keeping the references organized. One participant utilized EndNote for organizing copies of annotated sources to cite, in addition to the list of references. They described, “Basically each citation or article that I'm adding in the EndNote, I'm attaching as well, PDF of the article. So I'm doing all of my notes highlighting on that PDF” (Mike). The participants could have free access to Endnote through the university, and professors informed them that it was available to them.

6.12 Reasons for Not Utilizing the Available Resources

Although many forms of writing support are available to students, some professors stressed that each student is responsible for the decision to utilize the resources that are recommended.

> And sometimes that, you know that's part of the battle is just getting them to go [to the university writing studio]. Just being like, hey, like you know this is an issue that you need to fix. And they're like, oh no, I've got it. It's like, oh, you maybe don't. And so I feel like that's probably our biggest hurdle that we see with it is just like you know having them understand how to seek out those resources and that they, and that it's really foundational in the beginning, like once you've written half your manuscript, we're behind <laugh>, you need to seek them out at the beginning of this process. And I think that the students that do, you can tell a definite difference in what they're producing and they're handing in and we get to spend a little bit more time talking about the content instead of you know going through and doing a full you know like syntax edit for them. (Prof. Smith)

Professor Charles also described drastic differences in the writing of students who utilize suggested resources and students who do not. Based on the information from the sample of

students who participated in the study, it seems that the use of electronic resources is common, while seeking help from humans outside of the department (writing studio, tutoring, editors) is not. As discussed above, one potential cause of the reluctance to seek help from humans outside of the department could be avoidance of potentially bothering someone or taking their time.

When asked about going to the writing studio, one participant was not aware of the writing studio while they were writing their thesis, one preferred to wait until they had more progress on their draft, one preferred to wait until they were working on the literature review section, one who was interested in going did not go because of time limitations, one did not go because it was far (but admitted that they knew there were also online appointment options), and one would go "if nothing work." The student interviewee who was a native English speaker did not go because they felt confident about their writing without help.

Another possible reason for not seeking help could be procrastination. The student who wanted to make more progress on their draft before going to the writing studio, for example, could potentially delay going until the whole draft is finished. One participant, who also mentioned having trouble starting writing projects, described delayed plans for practicing English:

> Yes, because even nowadays, I have a schedule. I haven't start yet, and every day I'm telling to myself is tomorrow. However, I hope tomorrow is tomorrow. I have an idea with myself that an hour a day at least I will read for 20 minutes, listen for 20 minutes, writing for five or 10 minutes, and speaking with myself for five to 10 minutes, just an hour. (Amonton)

If tomorrow never becomes the tomorrow to start the new routine, the idea for practicing could always be an idea for the future.

Additionally, some professors attribute one possible cause of not seeking help to toxic masculinity. They had concerns that the gender-specific pressures in some cultures for men to be self-sufficient affected students' willingness to seek help from writing tutors. These concerns were based on their impressions that their students who are women spoke about the writing studio and other resources more than their students who are men, who generally submitted assignments with more language-related mistakes, but they clarified that their general impressions may not be accurate. Among the student participants, no link between gender and seeking writing help was identified (and gender information was not collected), but it was outside of the scope of this study to check for correlations between gender and seeking writing help. The students who chose to participate in the study to talk openly about their writing challenges may be among the students who are not influenced by societal pressures to avoid admitting difficulties, or at least difficulties pertaining to writing.

Another possible reason for students' preference to try only certain writing resources could be that students are limiting the circle of human support to individuals whom they have met. The students do not seem reluctant to ask their professors for help, and a few student interviewees mentioned asking colleagues to read their drafts. Generally, aside from the six survey respondents who went to the writing studio, students did not contact anyone outside of the department for help except for the librarian who they met in one of their courses. It is possible that students may be more willing to contact other humans for help, such as the tutors in the university writing studio, if they meet them personally before initiating contact. More research would be needed to confirm whether this speculation is accurate.

In sum, professors advertise the writing resources and speak with students individually who they think could benefit from writing help, but following the suggestions is the students'

choice. While the student participants identified many resources that are helpful, there are other resources that they could benefit them that they are not using. Future research could explore why some resources are under-utilized. It may be worth noting that some of the professors teaching courses that students take at the beginning of their program seemed to notice more language and organization-related challenges in student writing than other professors teaching courses that students take later in the program. It is possible that students make writing progress throughout their courses, and the program itself could be a form of language support. Throughout the program, students may be addressing their academic literacy challenges more effectively.

7 CONCLUSION

To address the paucity of research on writing in respiratory therapy, which connects EAL users who share research internationally in English, this study used corpora and ethnographic data to describe respiratory therapy RAs and theses, reading and writing challenges that EAL graduate students face, and solutions to these challenges. The findings provide EAP teachers with information that was previously unavailable about reading and writing in respiratory therapy. The first research question addressed the rhetorical and linguistic characteristics of respiratory therapy research articles, as well as comparisons between linguistic features in research articles and theses. The corpora of RAs and theses could be described by 4 dimensions. The first dimension, Lengthy vs. Concise Description, differentiated the student writing, with wordy descriptions, from the expert writing, with compressed descriptions. The second dimension, Descriptive Cohesion vs. Basic Linking, differentiated the descriptive connecting devices in the RA corpus from the simple phrasal coordination in the thesis corpus. Dimension 3, Discussing Academic and Discipline-Specific Topics and Processes, differentiated the ways that student and expert writers conveyed action-focused styles. Finally, Dimension 4 encompassed features that expert writers use for cautious author involvement. There were significant differences in the dimension scores of the RA corpus and the thesis corpus for all four factors. These findings can help EAP teachers make predictions about which grammatical features and components of academic style may be helpful for respiratory therapy students to practice.

Research articles in respiratory therapy were determined to have a consistent organizational structure. In introduction sections, obligatory moves for general openers, referencing specific findings, indicating the need for the study, and announcing the present study were identified. In methods sections, obligatory moves for describing the study and data,

procedures, and analysis (statistical or qualitative) were found. In results sections, providing general information about the sample, reporting the results of measurements, and giving the results of analysis were obligatory moves. In discussion sections, obligatory moves for introducing the discussion section, elaborating on the results, and listing the limitations were identified. Conclusion sections were less consistent, with an optional move for discussing the general topic of the paper, obligatory move of stating the results, optional move of providing interpretations of the results, and "core" move of stating the implications of the study. Within the moves, common steps contributing to the rhetorical function of the move were identified. The moves and steps differed somewhat from frameworks that were previously identified for other disciplines. With these findings, EAP instructors can teach students in the respiratory therapy discipline about organizational patterns in research articles from an informed perspective.

The second research question addressed the challenges that respiratory therapy students face in reading and writing respiratory therapy research articles. Interviews with respiratory therapy master's students and professors and a survey of respiratory therapy students revealed that some students face challenges with source-based writing (reading comprehension, paraphrasing, citation, and literature review-writing). Vocabulary, grammar, concision, organization, clarity, survey questions, topic selection, and mood-related factors also posed writing challenges for students. These findings provide new insights about discipline-specific writing challenges. The third research question explored the strategies or support that help respiratory therapy graduate students meet reading and writing challenges in their discipline. Strategies such as reading and writing practice, focusing on key ideas in texts, taking reading notes, finding themes in the literature, following the structure of example texts, revising drafts, and starting writing projects early help students cope with some of the source-based writing

challenges. Within the respiratory therapy department observed, a writing seminar, scaffolding assignments in courses, and support from instructors help students succeed in their writing projects. However, professors prefer that students use outside resources for feedback on grammar. Outside of the department, students are supported by a university librarian. Although students are encouraged to go to the university writing center and seek tutoring and editing services, following these suggestions was rare among student participants in this study. Students utilize electronic resources such as databases of academic sources, AI paraphrasing tools, translation tools, Grammarly, and citation software. With these resources, students are able to successfully overcome reading and writing challenges in their master's program. The findings on students' use of electronic resources may be helpful for informing ways to teach students to use them more effectively.

7.1 Pedagogical Implications

As grammar was found to be a common challenge among respiratory therapy graduate students, the MDA results can be used to inform pedagogy. Based on the findings from dimension 1, it can be concluded that language learners in the respiratory therapy discipline can benefit from learning how to use agentless passive, past participial clauses, and attributive adjectives to write concise descriptions, especially of their research procedures. These features were particularly useful for forming comparisons and describing procedures. Based on the dimension 3 results, agentless passives can help writers place focus on the procedures or processes. Data-driven learning is one approach that has been successful for teaching students how to use passive voice to write about research (Crosthwaite & Steeples, 2024). In addition, EAP and respiratory therapy instructors can particularly focus on helping students write descriptions concisely. It may be helpful to show students examples of how published authors

utilize concise description features for dense information-packing. The dimension 1 results also highlighted a need for students to be aware of the verb tenses that are expected for reporting research. One approach that has been successful for improving students' verb tense choices in research reports is guiding students to use corpora to analyze and discuss verb tense in each section of research articles (Friginal, 2013).

The second dimension provides insight into the cohesive devices that are prominent in the field of respiratory therapy. Respiratory therapy students can use predicative adjectives, *be* as a main verb, analytic negation, downtoners, and adverbs for descriptions, and link these descriptions using causative adverbial subordinators (*because*), conditional adverbial subordinators, concessive adverbial subordinators, adverbs, demonstrative pronouns, and pied-piping relative clauses (preposition + relative clause, linking a noun phrase to its description). The literature on cohesion has demonstrated that achieving coherence is not guaranteed by simply using appropriate connectors. One study found that the repetition of ideas across different paragraphs was a stronger predictor of perceived coherence than the use of cohesive linguistic features (Crossley et al., 2016b). With this research in mind, it can be recommended to teach students the organizational structure of research papers alongside the cohesive linguistic features that commonly occur in respiratory therapy writing. It is recommended to teach grammatical features in the context in which they are used (Nunan, 1998), and it may be helpful to expose students to contextualized examples of how the prominent descriptive and cohesive features fit within the larger organizational framework of the paper. Some studies have illustrated ways to teach cohesion in second language academic writing classrooms. In a classroom case study, Lee (2002) explored an approach to teaching cohesive features using six steps: (1) building students' awareness of purpose, audience, and context, (2) describing the macrostructure of texts, (3)

describing how information is distributed throughout the text and how topics are developed, (4) developing and describing propositions, (5) teaching linguistic features of cohesion, and (6) teaching metadiscourse markers. Within each step, students did activities such as analyzing and discussing examples, reading handouts with information about cohesion, completing writing activities, and revising pieces. The coherence ratings of students' writing samples were higher for texts written after the cohesion training than the texts written before the cohesion training. Students also demonstrated increased awareness of cohesion in interviews and thinkalouds. A similar model of building metacognitive awareness of cohesion strategies with a pre-writing, writing while monitoring cohesion, and post-writing cohesion revision based on feedback stage has also demonstrated success in a classroom study (Briesmaster & Etchegaray, 2017).

Based on the dimension 4 results, respiratory therapy instructors and EAP teachers of respiratory therapy students can address the level of boldness of claims in research writing. In particular, they can show students how to use adverbs and possibility modals to adjust the epistemic stance of their claims and use first person pronouns (in addition to passive voice) for author involvement in the text. Teaching EAP students about stance through analyzing examples, identifying evidence that authors provide for claims, identifying stance-related linguistic features in texts with varying levels of boldness, practice writing agreement and disagreement with other texts, and practice adjusting bold claims demonstrated success in a longitudinal study (Crosthwaite & Jiang, 2017).

In addition to these grammatical features, based on respiratory therapy professors' comments, the grammar and culture behind question writing and reading may be worthwhile for teachers to address. Students can be exposed to sample research questions and survey questions from articles in their field. Students can analyze the reasons that questions from example surveys

are included, considering how answers would address the research questions. Feedback on the clarity of survey questions written by students may also be beneficial. In a case study on EAP students' development in analyzing how research questions are posed in academic texts, Gui et al. (2023) found that guidance from students' advisors to analyze the progression of the cited literature to the research questions in example texts was helpful, and that their ability to analyze research questions developed very gradually over time. It could be hypothesized that the development of survey question analysis skills may follow a similar pattern. It may be helpful for respiratory therapy courses and EAP courses with respiratory therapy students to address strategies for searching the literature for existing surveys that can be cited and used, as published surveys have advantages in the field of respiratory therapy. University librarians could also integrate information about finding published surveys into their support for finding discipline-specific sources. EAP and respiratory therapy instructors can also help students practice reading and interpreting test questions from sample tests within the respiratory therapy discipline.

In light of the challenges that master's students face with organizing their writing, the move analysis results provide EAP and respiratory therapy instructors with a clear organizational framework for students in the respiratory therapy discipline to follow. As interview participants mentioned, understanding the expected organizational framework of a genre can make writing tasks more approachable. Because preplanning writing tasks can improve speed (Abdi Tabari, 2021), at least for timed argumentative essays, and the framework provided by the move analysis results can aid in the pre-planning process, teaching the move schema could potentially help students with one component of writing speed concerns, but it is not certain that preplanning would have the same effect in untimed tasks. It would be recommended to introduce the moves and steps that were identified in this study with multiple examples. In particular, examples with

and without steps that fall into non-obligatory categories may be helpful for students to see options for the information that can be included in research articles. It would also be recommended to expose students to examples with and without cycling of steps, and in some sections with and without cycling moves, so that students have a broad perspective of organizational options. With multiple options, students can choose the steps that they want to include in their papers and the order of steps that best suits the information they need to share. Awareness of variation in genre conventions is important to avoid giving students an overly-restricted view of genre norms (Dudley-Evans, 1997).

For teachers preferring inductive approaches, students can be guided to notice move-step patterns in discipline-specific corpora (Flowerdew, 2022). For example, Charles (2020) describes activities for students to analyze examples of moves in a section of journal articles in their fields (from self-compiled discipline-specific corpora) to learn discipline-specific conventions by discovering patterns. These activities were followed by concordancing activities to search for examples of words relating to each move. By using self-compiled corpora, students in an EAP class with multiple disciplines could learn about rhetorical structures in their own fields and share their findings with classmates in other disciplines. This approach could be feasible for teaching respiratory therapy students in general EAP classes with students from multiple disciplines.

In addition to using the move analysis results to teach EAP writing, genre-based approaches exposing students to move schemes in academic writing are also helpful for teaching EAP reading. When students understand what to expect in research articles in their field, they may be able to easily follow the information flow of research articles that they read and find specific information in research articles if needed. Hyon (2001) describes the success of genre

analysis for teaching EAP reading. She describes activities that guided students to discuss what research article authors were communicating in specific moves of a text and then analyze and describe the structure of full research articles. After becoming familiar with the organizational structure, students were given reading activities to quickly locate key information in research articles. After taking a course with these genre-based activities, among others, students reported feeling confident while reading academic texts and retaining their genre-awareness while reading a year later. Based on Hyon's case study, the move-scheme identified in the respiratory therapy RA corpus may be informative for teaching EAP reading to students in the respiratory therapy field.

In addition to genre-informed academic reading, addressing other general second language reading challenges would be recommended. To prepare respiratory therapy students for a heavy reading load, it would be recommended to work on reading speed, which could indirectly improve source-based writing speed. Extensive reading (free voluntary pleasure reading) can help additional language learners increase their reading speed (Al-Homoud & Schmitt, 2009; Lao & Krashen, 2000; Suk, 2017) and improve their reading comprehension (Suk, 2017). Engagement in the reading process is associated with higher reading proficiency (Ghavamnia & Kashkouli, 2022), and EAP teachers can thus address issues of boredom while reading. Extensive reading can improve attitudes towards reading (Al-Homoud & Schmitt, 2009; Lao & Krashen, 2000). The improved attitude may be transferrable to academic texts (Spack, 2004), and improved reading speed and comprehension can help language learners approach new texts more confidently (Hedgcock & Ferris, 2018). For these reasons, extensive reading may be helpful for graduate students who do not enjoy reading who will have a heavy reading load for their courses. Hedgcock and Ferris recommend combining extensive reading with intensive

reading instruction, addressing strategies for prereading, active engagement while reading (making annotations, completing graphic organizers), and post-reading reflection and connection to writing. Respiratory therapy faculty can recommend students experiencing reading challenges to try the aforementioned strategies. For students using AI tools to simplify authentic texts, teachers can provide students with terms to include in their prompts (such as CEFR levels or Lexile levels) for adjusting the difficulty level of simplified texts. Students can be encouraged to increase the difficulty level of the requested simplifications as their reading proficiency improves. Although GPT-4 simplifications of medical texts have been found to retain high levels of accuracy (Picton et al., 2025), teachers can encourage students to read AI-generated simplifications critically, as there is a small chance of inaccurate portrayal of the source texts (L. Huang et al., 2025). In the absence of inaccuracies, AI paraphrases have also been found to have subtle differences in stance from the original texts (Alia & Aliia, 2025). Given the potential usefulness of AI-generated simplification of medical texts and the small chance of inaccurate changes, it has been recommended that human experts review AI-generated simplifications (Picton et al., 2025). Respiratory therapy instructors could consider generating and checking simplified texts for students with reading comprehension challenges, and EAP teachers could consider collaborating with respiratory therapy instructors to generate simplified texts reviewed by human experts for reading practice activities.

Based on student and teacher descriptions of paraphrasing challenges, EAP teachers can prioritize teaching respiratory therapy students paraphrasing skills. Skills can include making sufficient changes to the wording of the source text (Keck, 2006) and synthesizing information from multiple sources (Grabe & Zhang, 2013). As students found literature review sections to be challenging to write, teachers can address paraphrasing within the context of the goals of a

literature review. Ethical and effective uses of AI tools for paraphrasing can also be addressed, with an emphasis on critical engagement with the AI output using higher-order thinking skills (Wang et al., 2023). Respiratory therapy instructors can specify permissible and impermissible uses of AI tools for their assignments and expectations for acknowledgement of AI use.

Building students' vocabulary is also recommendable. Students reading and writing respiratory therapy genres utilize general, academic, and discipline-specific vocabulary. Although there are many factors that can impact vocabulary learning, exposing language learners to vocabulary in meaningful contexts and engaging learners in activities to produce the words is generally recommended. One approach to teaching vocabulary that has been suggested is a combination of reading and interactive instruction consisting of exposing learners to vocabulary words multiple times in meaningful contexts, providing rich information about each word, helping students connect the words to their experiences, and actively engaging students in using the word (Zimmerman, 1997). Task-based language teaching can also be effective for teaching vocabulary, including technical vocabulary (Sarani & Farzaneh Sahebi, 2012). Task-based language teaching can provide students with practice using words in realistic contexts to accomplish tasks that align with the goals for learning the target language.

In addition to linguistic and academic literacy skills, it may be worthwhile for EAP teachers and respiratory therapy instructors to address emotional concerns that affect the reading and writing process. In light of the unfavorable role of boredom in second language writing (F. Huang & Zhang, 2025), teachers can aim to help students develop a positive attitude towards writing. For many students, writing tasks that align with their future goals can be motivating. For example, Sabet et al. (2014), found that university students who learned to write the rhetorical moves in abstracts through task-based language teaching had higher motivation than students

learning in through a traditional method, and students with higher motivation wrote better abstracts. Additionally, Rong et al. (2025) found that "growth mindset" training led to higher engagement and writing test scores among EFL students at a medical university. The growth mindset training consisted of videos and comments and feedback from the teacher, focusing on emphasizing that L2 writing can be improved, encouraging resilience to writing setbacks, providing positive L2 writing role models, encouraging students to express positive beliefs, and promoting collaboration. Similarly, helping learners envision their ideal selves as more proficient second language users in the future, promoting personal expectations for linguistic growth, and encouraging students' sustained persistence and interest in learning has had positive results for second language writing (Fathi et al., 2024). Preparing students to make decisions about the topic of theses or other writing projects could also be beneficial. EAP teachers and respiratory therapy instructors can discuss strategies for thinking about a topic. Based on respiratory therapy instructors' comments about students' lack of interest in their thesis topics, it may be beneficial for EAP teachers within US contexts to address the potential expectation that students would be interested in their thesis topic choice (Xia, 2013) and for respiratory therapy instructors to specify their expectations for factors influencing topic selection.

7.2 Limitations

Although the study led to findings with potentially useful pedagogical implications, there are some limitations. One limitation of this study is the comparability of the Thesis and RA corpora. It would be more ideal to collect research articles written by master's students to compare the same genre, but collecting enough samples from the participant pool for an adequate comparison was not feasible. Theses were the most similar genre to research articles that could be collected in large quantities, and the amount of revision that goes into theses is more

comparable to that of published research articles than coursework papers. As many students publish journal articles that are revised forms of their theses, the two genres could be considered comparable. Another limitation is the size of the thesis corpus. Future studies can aim to continue to collect new theses to grow the corpus to improve the sample. Although collecting theses primarily from the university where participants were recruited was helpful for making connections between ethnographic and corpus data in this study, increasing the number of universities supplying theses to the corpus would also improve the generalizability of the results.

Move analysis approaches also have some limitations. Since move analysis is done manually, time limitations affect the number of texts that can be analyzed. It would be more ideal to analyze a larger number of texts. Nevertheless, this study included a larger move analysis sample than most move analysis studies of full research articles. Another limitation of move analysis is that there can be subjectivity in determining moves. However, steps were taken to mitigate this issue:

1. Phrases performing more than one move/or step were coded for all of the moves or steps they performed rather than making judgments about which move or step was performed more prominently
2. Sentences or phrases that did not fit into any move or step were assigned into an "other" category, and all the phrases in the "other" category were examined to look for common trends

A third limitation of the move analysis is that only one rater analyzed the texts. It is more ideal to conduct move analysis studies in a research team.

There are also limitations in the ethnographic approaches. One limitation is reliance on self-reported data from survey and interview participants. However, for this project, a benefit of

self-reported data was gathering information about skills in reading and writing that were challenging for participants in the past but were no longer challenging at the time of data collection. This allowed for learning about their journeys to overcoming the challenges. Gathering instructors' impressions of students' challenges relied on their subjective opinions, but this limitation could be reflective of the importance of instructors' impressions in practice—instructors' opinions are what lead to some students being referred to writing resources. Another limitation is that there was a single coder for interview data. To counter-balance this limitation, faculty participants were offered an opportunity for member-checking to evaluate the accuracy of the interpretation of their input. Collecting data from a single university is also a limitation of this project. However, focusing on a single department allowed for detailed analysis of the data. Finally, the number of survey responses could be considered a limitation. Future studies can aim to collect information from larger pools of respiratory therapy students.

7.3 Future Directions

The results of this study can be used to inform further exploration of academic literacy in respiratory therapy. For example, although significant differences between the writing styles of students and experts were revealed through the multidimensional analysis, it remains unknown how these differences are perceived by readers, aside from what was mentioned by instructors in interviews. Many linguistic features that were overused or underused by student writers were noted, but whether readers notice these differences was not within the scope of the study. Future studies can explore this topic to further understand which combinations of features are useful for EAP teachers of respiratory therapists to focus on. Because of the conflicting results from studies on linguistic features contributing to coherence, readers' impressions of dimension 2 features in respiratory therapy texts may be particularly informative.

Future studies can also expand the move analysis project by analyzing more respiratory therapy texts, working in teams of multiple raters, and exploring whether adherence to common moves affects readers' perceptions of text organization and readability. Examining linguistic features that are common in each move and step may also be worthwhile (Biber et al., 2007) to offer EAP students and teachers more details about writing each move. Additionally, future studies can continue to explore pedagogical approaches for helping students develop awareness of organizational trends in field-specific writing.

It may be worthwhile to explore ways to improve students' use of academic literacy resources. Students in this study were not utilizing any form of one-on-one tutoring at a high rate. It may be worthwhile to find ways to increase students' interest in one-on-one help that is available through universities. As students were open to seeking help from professors within the department, it may be worthwhile to explore whether students would attend reading and writing tutoring within respiratory therapy departments if that option was available. Students were open to meeting with a university librarian that they met in person, and future studies could explore whether meeting university writing center tutors in person would increase attendance. The use of electronic resources was more common among participants in this study. To inform recommendations for the use of generative AI paraphrasing tools, it may be helpful to collect papers from students containing sentences that are paraphrased with and without AI support and evaluate their paraphrasing quality. Whether human-paraphrased versions of AI-generated paraphrases of human-generated sentences have any advantages over students' independent paraphrases remains a question, in spite of participants' enthusiasm about their approaches.

To enhance the implementation of the findings of this study, future work can aim to develop pedagogical materials based on the findings that are easy for EAP and respiratory

therapy instructors and learners to access. Resources such as online activities or textbooks based on the MDA and move analysis results could facilitate EAP teachers' applications of the findings. Materials development could also aim to facilitate independent EAP literacy practice tailored for respiratory therapists learning English as an additional language. The results of this study have potential to lead to useful materials development, and future studies can continue to make progress in this area.

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APPENDICES

Appendix A: Examples of Studies Pointing to Disciplinary Variation in Research Articles

Appendix A.1. Studies on RAs in a Single Discipline

Study	Discipline	Methods	Findings
Kanoksilapatham (2005)	Biochemistry	Move analysis	15 moves were identified: Introduction: Announcing importance of the field, preparing for present study, introducing present study Methods: describing materials, describing procedures, detailing equipment, describing statistical procedures, stating procedures, justifying methodology Results: Stating results, comments on results Discussion: Contextualizing study, consolidating results, stating limitations, suggesting future research.
Posteguillo (1999)	Computer science	Analysis of the organizational structure	-IMRD model does not fit computer science RAs

			-Introductions and conclusions were common, but they used moves identified by previous studies in a cyclical way -After introductions, there were often preliminaries and/or algorithm or problem-algorithm sections (the term "methods" is rare) -More than half the articles had a results section
Chang & Kuo (2011)	Computer science	Vocabulary list + move analysis	-A list of 335 word familied was formed -Computer science articles deviate from the IMRD pattern—results are mixed into the methods -Methods were very elaborated -Some moves like referring to other studies occurred throughout the sections -Online writing materials were developed based on the

			findings, and students had positive impressions of the activities
Ozturk (2007)	Applied Linguistics (SLA and second language writing)	Move analysis	-SLA abstracts followed the CARS model, but second language writing abstracts had more variation
Ruiying & Allison (2004)	Applied linguistics	Analysis or the organizational structures-comparison of primary and secondary RAs	-Primary RAs used IMRD framework, but sometimes using unconventional headings -Secondary RAs used Introduction, Argumentation, Conclusion format -Theory-oriented argumentation sections tend to take a position and provide sub arguments -Pedagogy-oriented argumentation sections have problem-solution or demand-supply formats

			-Application-oriented arguments have problem-solution-demonstration formats
Conrad (1996b)	Ecology	MDA (comparing to ecology textbooks)	-Differences between what students read (textbooks) and what students are expected to write (research articles) were identified -Difference: articles have a more informational, impersonal style Similarities: lack of narrative style
Biber & Jones (2005)	Biology	MDA of vocabulary-based discourse units	-Discourse units were identified -Four factors: "Evaluation of possible explanations," "current state of knowledge vs. past events in actions," "procedural description of actions/events," and "abstract/theoretical discussion of concepts"

Tarone, Dwyer, Gillette, & Icke (1998)	Astrophysics	Comparing passive and active voice	-Active voice with *we* is as frequent as passive voice -*We* is used to describe authors' choices in the procedures (passive is used with established standard procedures) and cite the authors' work -Passive voice is used to propose studies -Length of phrases and emphasis play a role in active or passive voice selection
Warchał (2010)	Linguistics	-Analysis of *if* clauses with interpersonal functions	-Functions of if clauses that were identified: guiding readers' interpretations, engaging readers with open questions, negotiating terminology and concepts, avoiding criticism, indicating problems, recognizing alternative views, and eliciting approval from readers

Hewings et al. (2010)	Psychology	-Analysis of citations in corpus of articles from Expanding Circle countries (what language are the references cited written in) -Analysis of the interpersonal relationships between paper authors and the citated authors	-Most citations are in English, and non-English quotes are often translated to English -Authors cite their own work alongside work from inner-circle countries -Articles published in national contexts cite local work and Anglophone work, whereas articles published in international contexts cite more anglophone work
Dueñas (2007)	Business Management	Comparison of self-citations and first-person pronouns in RAs in English for readers in North American and Spanish for readers in Spain	-English RAs had more self-citations and first-person pronouns than Spanish RAs

Koutsantoni (2004)	Electronic and electrical engineering	Analysis of attitude, certainty, and common knowledge stance markers	-Most common attitude markers: evaluative adjectives -Common certainty markers: certainty adverbs, expressions of confidence, and certainty adjectives -Frequent common knowledge markers: evaluative adjectives
Koutsantoni (2006)	Electric and chemical engineering	Analysis of the density and function of hedges in RAs and student theses	-Professional RAs have fewer hedges, but the hedges that are used express personal stance more than the student hedges
Crosthwaite et al. (2017)	Dentistry	Hedging, boosting, self-mention, and attitude markers were compared in professional and student writing	-Professional writers use a narrower range of hedging, boosting, self-mention, and attitude markers than students -Lists of common stance markers from each group are provided
Martínez, Beck, & Panza (2009)	Agriculture	Analysis of AWL words	The academic words had different, discipline-specific meanings, and the "general" words had academic meanings

Vongpumivitch, Huang, & Change, (2009)	Applied linguistics	Analysis of AWL words	The AWL words were commonly used, but there were additional discipline-specific words that were frequent across many texts

Appendix A.2. Studies Comparing RAs in two or More Disciplines

Study	Disciplines	Methods Applied to RAs	Findings on RAs
Lin & Evans (2012)	39 disciplines	Analysis of the organization of RA sections	Some disciplines used certain formats (such as combined results and discussion sections) more than others
Swales et al. (1998)	Art history, chemical engineering, communication studies, experimental geology, history, linguistics, literary criticism, philosophy, political science, and statistics	-Analysis of imperatives in different sections -Interviews with authors of some of the texts about their choice to use imperatives	-There were disciplinary differences in the distribution of imperatives -Imperatives were found in discipline-specific phrases -Imperatives could be used for stylistic purposes, engaging the reader, or concision

Swales (2005)	Dentistry, medicine, cell biology, electrical engineering, mechanical engineering, applied linguistics, marketing, philosophy, sociology, and physics	Analysis of attended and unattended *this*	There was less disciplinary variation than expected, but linguistics and philosophy used clause initial *this* less than other disciplines, while dentistry used it more, and the nouns that followed attended *this* varied
Gray (2010)	Education and sociology	Analysis of this/these as determiner and pronoun	-There was disciplinary variation in the sentence initial use of *this* and *these* -This/these as pronouns usually refer to clauses -Nouns following this/these determiners are usually shell nouns or abstract nouns
Hyland (2008)	Electrical engineering, microbiology, business studies, and applied linguistics	Comparing four-word lexical bundles in RAs, dissertations, and MA theses	-Different bundles were found in each discipline -Electrical engineering had the widest range of bundles, and microbiology had the smallest range of bundles

		-Electrical engineering had the densest bundle distribution -The structures differed across discipline -Social sciences had more bundles beginning with a prepositional phrase, and hard sciences had more passive voice and anticipatory *it* bundles -The "research-oriented" bundles had higher concentrations in the hard sciences, but linguistics and business had more text-oriented bundles -Out of the participant-oriented bundles, stance bundles occurred more in social sciences, and hard sciences mostly used engagement bundles

Cortes (2004)	Biology and history	-Most frequent four-word lexical bundles were identified in biology and history RAs -The use of the bundles identified was examined in student writing	-The structures of common lexical bundles in history and biology were different, but there were overlapping functions -Students did not use the lexical bundles from their disciplines frequently
Conrad (1996a)	Ecology and American history	MDA	Differences in narration, overt argument, and impersonal style were identified across disciplines
Groom (2005)	History and literary criticism	Comparing the occurrences of *it* v-link ADJ *that* and *it* v-link ADJ *to*-inf in two disciplines	There were different distributions of the phrases across discipline
Martínez (2001)	Physical, biological, and social sciences	Analysis of the distribution of material, mental, verbal, relational, and existential processes	-Physical sciences had more passive voice, and social sciences had more active voice in the methods sections

		in passive and active voice across RA sections	-The process types used related to the function of the sections they appeared in -There was a struggle between objectivity and persuasion
Hyland (2002)	Electrical engineering, philosophy, physics, mechanical engineering, applied linguistics, sociology, marketing, biology	Analysis of frequency, form, and function of directives	-Imperatives were the most common directives in RAs -The frequency of directives varied across discipline. Electronic engineering, for example, had 29.0 directives per 10,000 words, whereas biology had 12.3. -The proportion of directives devoted to different functions (textual, physical, and cognitive acts) varied across discipline -Hard sciences (except for biology) had more directives for physical acts, and they

			were often used to engage readers -Soft disciplines (except for philosophy) had more textual directives)

Note. Some studies had additional findings, such as comparisons to writing in textbooks, that are not listed, as they are not the focus of this review.

Appendix A.3. Studies on Health Science RAs

Study	Methods	Findings	Critiques/limitations
Atkinson (1992)	MDA + rhetorical analysis (using Bazerman's 1988 text characteristic questions)	The structure of medical research articles has changed over time from narrative letters reporting one case to the modern-day objective IMRD style	-The findings might be outdated now -The poles on Biber's (1988) "Informational vs. Involved production" factor are flipped (informational is positive and involved is negative), so comparing his results to

			subsequent studies is less straightforward than it could be
Salager-Meyer (1994)	Calculating the frequency of different types of hedges in each section of RAs and case reports	-Most of the hedges were shields, approximators, and compound hedges -Highest frequency of hedges was in the discussion (RA) and comment (CR) sections, lowest frequency was in the methods (RA) and case report sections (CR) -Introductions (both genres): most hedges were shields, used in establishing the niche -Methods (RAs), results (RAs), and case report sections (CR): most hedges were approximators -Discussion (RA) and Comments (CR): most hedges were shields and compound hedges	-Small corpus size (15 texts)

Thomas & Hawes (1994)	Analysis of reporting verbs, categorized as "Real-World or Experimental Activity Verbs," "Discourse Activity Verbs" and "Cognition Activity Verbs"	-52% of the reporting verbs found were classified as experimental activity verbs (finding and procedural verbs), mostly used to report findings, 39% as discourse activities (pre and post experiment tentative and confident assertion with informing and argument verbs, qualification verbs), and 9% as cognition activities -Statements about results usually have either certainty informing verbs or experimental activity verbs -General conclusion sentences usually have either effect verbs or tentative verbs	Small corpus size (11 texts)
Webber (1994)	Locating questions in academic journals on different text types and	-Questions were found most in editorials and review articles, followed by letters -Titles and headings were a common place to find questions -Questions were found at beginnings of paragraphs	-Only a few journals were included, but there were many texts in each journal

	analyzing their functions	-Questions were used for distancing or hedging -Questions were used in closings with future research directions -Questions were used for criticisms	
Williams (1996)	Analysis of lexical verbs (reporting, observation, relations, defining, cause and effect, change and growth, and methods verbs) in clinical and experimental medical research articles	-The most common lexical verbs in each category and genre were identified -Clinical reports used more assertive reporting verbs, and experimental articles used more tentative reporting verbs.	-Small corpus (8 texts)
Nwogu (1997)	Move analysis	Moves identified: background information, review of previous research, goal of the paper and	Small corpus size (30 texts)

		procedures used, data collection process, procedures and materials, data analysis, observations, overall outcomes of the research, and implications	
Biber & Finegan (2001)	Comparison of linguistic features in each section to other sections and to other registers of English + MDA (calculating Biber's 1988 dimension scores)	Comparisons Among Sections Introduction sections: more frequent *that* verb complement clauses, first person pronouns, possibility modals, and present tense Methods: more past tense and agentless passives Results: more present and past tense Discussion: more *that* verb complement clauses, possibility modals, downtoners, and present tense. Comparisons to Reference Corpus - *that* verb complement clauses and agentless passives were more common in the introduction section, past tense and agentless passives were more common in the methods	Small corpus size (20 texts)

		section, downtowners (to a small degree) and agentless passives were more common in the results section, and *that* verb complement clauses, possibility modals, downtoners, and agentless passives were more common in discussion sections. MDA Findings Introductions had more elaborated references and methods sections were more informational, non-narrative, and impersonal than the other sections.	
Vold (2006)	The occurrence of epistemic modality words was compared in medicine and linguistics RAs	-Lists of the most frequent epistemic modality words in RAs from each discipline are provided -In medical articles, *may*, *suggest*, and *might* were the most frequent epistemic modality words, and in linguistics articles, *seem*, *suggest*, and *assume* were the most frequent epistemic modality words	-Small corpus (40 texts, 20 from each discipline) -Explanation on how these two disciplines were chosen for comparison would be helpful

		-Epistemic modality was used with first person pronouns in linguistics articles, but usually not in medical articles -Most of the functions of epistemic modality were shared between the two disciplines, but linguistics articles used them to soften criticisms while medical articles did not	
Chen & Ge (2007)	Frequency of AWL words in 50 medical RAs were found	-Many AWL words were prominent in medical RAs -The AWL list does not include enough discipline-specific vocabulary for students of medicine -The distribution of academic words across different sections of RAs suggest that they have rhetorical functions	N/A
Li & Ge (2009)	Comparison of Nwogu's (1997) rhetorical moves in	-Moves 1 and 6 that had been identified as optional and became obligatory -Move 9 was identified as obligatory and became optional	-Small corpora (25 texts in each group)

	medical RAs from 1985-1989 and 2000-2004	-Linguistic features in each move changed	
Biber, Gray, Honkapohja, & Pahta, (2011)	-The occurrences of *on* and *in* were coded for function (noun modifier, clause complement, or other functions) in medical texts from different time periods between 1375 and 1700 -They were compared to their occurrences in	-*On* and *in* were used for noun modification, but other functions were more common -Abstract uses of *on* and *in* became more common over time, and the abstract uses of *in* came earlier than abstract uses of *on* (this is attributed to Latin influence)	N/A

	present-day corpora -Concrete and abstract uses were compared		
Salazar (2014)	-Identifying frequent lexical bundles in biomedical RAs and their structural and functional characteristics -Comparing these findings in corpora of texts written by native and nonnative English speakers	-A list of the most common bundles is provided -Research-oriented bundles, text-oriented bundles (connecting ideas), and participant-oriented bundles (engaging readers) were identified -Noun phrase + of (research-oriented bundles), prepositional phrases (text-oriented bundles), and anticipatory *it* (participant-oriented bundles) were common -NNESs overused certain bundles, leading to lack of variation, and used few participant-oriented bundles	N/A

Mbodj (2021)	Analysis of collocations, multiword collocations, lexical bundles, and frames	Formulaic language had different discourse functions in case reports and research articles	N/A

Appendix B: Survey for Respiratory Therapy Students

1. What types of challenges do you encounter when reading research articles in English? (select all that apply)

    - ☐ Understanding the language
    - ☐ Understanding the content
    - ☐ Identifying key information
    - ☐ Reading at a good speed
    - ☐ Focusing on the text
    - ☐ Other: _____

2. What types of challenges do you encounter when writing research articles in English? (select all that apply)

    - ☐ Finding sources
    - ☐ Integrating source information into your writing
    - ☐ Vocabulary
    - ☐ Grammar
    - ☐ Organization

- Presenting the ideas clearly for the reader
- Connecting ideas
- Writing at a good speed
- Other: _____

3. What are the most difficult sections of research articles to read?
    a. Abstract
    b. Introduction
    c. Literature review
    d. Methods
    e. Results
    f. Discussion
    g. Other: _____
4. What are the most difficult sections of research articles to write?
    a. Abstract
    b. Introduction
    c. Literature review
    d. Methods
    e. Results
    f. Discussion
    g. Other: _____

    Why do you find this section to be most difficult to write? _____
5. To what extent did the skills that you learned in English courses help prepare you for reading in your respiratory therapy classes?

1. Not at all
2. A little
3. Enough
4. A lot

Comments: _____

6. To what extent did the skills that you learned in English courses help prepare you for writing in your respiratory therapy classes?

1. Not at all
2. A little
3. Enough
4. A lot

Comments: _____

7. What skills that you learned in your English courses have been helpful in your respiratory therapy studies?

_____

8. What skills that you learned in your English courses helped prepare you for reading research articles? (select all that apply)

- ☐ Identifying main ideas
- ☐ Recognizing author's tone
- ☐ Knowing the type of information to expect to find in each section of a research article
- ☐ Skimming strategies (reading quickly to get a general idea of what the text is about)

- Scanning strategies (looking for particular pieces of information)
- Understanding academic vocabulary
- Figuring out the meaning of words using the context
- Reading quickly

Other: _____

9. What skills that you learned in your English courses helped prepare you for writing research articles? (select all that apply)

- Organization/Knowing what type of information should go in each section of a research paper
- Explaining your ideas clearly
- Connecting your ideas
- Finding academic sources
- Using academic sources to support your ideas
- Paraphrasing information from sources
- Grammar skills
- Other: _____

10. Did your English courses adequately prepare you for paraphrasing information from academic sources and integrating the information into your writing?

a. Yes

b. No

11. Did you learn how to write annotated bibliographies in your English courses?

a. Yes

b. No

12. What do you wish you had learned or practiced in your English courses that your English program did not address?

_____

13. What elements of reading would you like to improve? (select all that apply)

- ☐ Comprehension
- ☐ Vocabulary
- ☐ Speed
- ☐ Focus/attention
- ☐ Memory
- ☐ Other: _____

14. What elements of writing would you like to improve? (select all that apply)

- ☐ Academic style
- ☐ Organization
- ☐ Cohesion
- ☐ Vocabulary
- ☐ Grammar
- ☐ Finding sources
- ☐ Paraphrasing information from sources
- ☐ Speed
- ☐ Other: _____

15. Will you write or are you currently writing a master's thesis?

a. Yes

b. No

Why or why not? _____

What are the challenges in writing a master's thesis? (select all that apply)

- ☐ Reviewing literature related to your topic
- ☐ Writing arguments that your research area is important
- ☐ Explaining your project clearly
- ☐ Summarizing your findings
- ☐ Connecting your ideas
- ☐ Academic style
- ☐ Grammar
- ☐ Other: _____

16. What are some ways that you deal with the challenges of reading in your respiratory therapy classes? (select all that apply)

- ☐ Talking to your instructors about the texts
- ☐ Talking to your classmates about the texts
- ☐ Looking for other sources of information of the topics you are reading about (other articles, videos)
- ☐ Focusing on key information in the abstract and conclusion
- ☐ Other: _____

a. Have these approaches been successful for you?

i. Yes

ii. No

Comments: _____

17. What are some ways that you deal with the challenges of writing in your respiratory therapy classes? (select all that apply)

- ☐ Asking your advisor or other instructors for help
- ☐ Going to the Writing Studio
- ☐ Using computer tools (like Grammarly)
- ☐ Other: _____

a. Have these approaches been successful for you?

i. Yes

ii. No

Comments: _____

18. Is English one of your first languages?

Yes

No

If not, how old were you when you started learning English?

_____

Describe how you learned English.

_____

Would you be interested in participating in an interview about reading and writing in respiratory therapy?

Yes (email: _____)

No

Thank you for completing the survey!

Appendix C: Individual Faculty Interview Questions

What types of reading and writing is done in the courses that you teach?

For your courses, do you often need to teach academic literacy skills? What approaches do you use?

In your courses, do you explicitly teach reading and source-based writing skills?

What are common academic literacy challenges that you see students face?

What do you do to try to help them address these challenges?

Do students struggle with reading comprehension? Does this affect their writing?

What types of issues do you commonly see in students' source-based writing?

Do students have difficulty selecting sources?

Is paraphrasing difficult for students?

Do you ever see cases of accidental plagiarism that happens because students do not know how to paraphrase and give attribution? Does it happen frequently? Does it happen at the same frequency in the writing of students who use English as a first language and in the writing of students who use English as an additional language?

Do you have any scaffolding techniques to help students overcome reading or writing difficulties?

Do you see annotated bibliographies as a scaffolding tool to help students learn how to write papers?

What types of challenges do you see students have specifically in the thesis-writing process?

What do you think is valued in respiratory therapy research article writing? What writing suggestions do you have for students?

In your opinion, what are the qualities of a well-written respiratory therapy research paper?

In your opinion, what are some qualities of a poorly-written respiratory therapy research paper?

When submitting respiratory therapy research articles for publication, what types of issues can lead to rejection that students should avoid? Do feel like teaching academic literacy takes time away from teaching the content that you need to teach?

What types of skills could be taught in English classes to reduce the load of academic literacy instruction in the respiratory therapy classes?

If there was an English as a second language class or program specifically designed for respiratory therapists, what do you think the reading and writing instruction would need to focus on? In terms of reading and writing, what do you want students to know how to do before entering the master's program? What skills do you want them to have?

How much reading per week do students need to be able to handle?

What do you think students should know about research article writing before entering the master's program?

Are there any common writing issues or reading issues that you observe that you think academic ESL programs could address?

Appendix D: Interview Questions for Current Respiratory Therapy Students

Tell me about your English learning background.

Did you learn English in classes?

At what age did you start learning English?

Did you take English courses at a university before or during the respiratory therapy program?

What challenges do you face in reading research articles?

Do you have difficulty understanding the reading you are assigned?

Is the reading load in your classes heavy? How many pages per week do you have to read?

What are the most challenging sections of research articles to read?

What challenges do you face in writing research articles?

How do you find sources?

What is your writing process like? How do you start writing a research paper? What are the steps you take?

What are the most challenging sections of research articles to write?

How much do you think the information that you learned in English courses help in your respiratory therapy classes?

What information from English classes has been helpful?

What do you wish your English classes could have addressed more? What do you wish you had learned?

What information from English courses was helpful for reading research articles?

What information from English courses was helpful for writing research articles?

Are there any skills that you think you still need to improve in academic reading and writing?

Are you writing or planning to write a thesis? Why or why not?

Are there any resources that you use to help you cope with reading and writing challenges?

Do you go to the writing studio?

Do you use any electronic tools, like translators or grammar checkers?

Do you have any suggestions for how to best prepare new respiratory therapy graduate students for academic reading and writing?

Appendix E: Interview Questions for Former Respiratory Therapy Students who Successfully Completed Theses

What was your thesis about?

Tell me about your thesis writing process.

What were the steps that you took?

How did you integrate reading and writing skills during the thesis writing process?

What were the challenges that you faced while writing your thesis?

What were the most difficult things?

How did you cope with these challenges?

Were there any resources that were helpful for you?

Was there anything that you learned in your English classes that was helpful during the thesis writing process?

Do you think there are any ways that your English classes could have better prepared you to be able to write a thesis?

Was writing a thesis helpful for your career or your academic goals? Was it worth the effort?

What recommendations would you give to other respiratory therapy students writing a thesis?

What recommendations would you give to English teachers teaching international students who will eventually study respiratory therapy and write a thesis?

Appendix F: Observation Consent Form

Georgia State University

Informed Consent

Title: Writing about Research in Respiratory Therapy: Comparing Published Research Articles and Master's Theses and Exploring the Academic Literacy Writing Challenges of Graduate Students

Principal Investigator: Diane Belcher

Student Principal Investigator: Ashleigh Cox

Procedures

You are being asked to take part in a research study. If you decide to take part, you will be observed during your regular online class. Things that happen in class that are related to learning reading and writing skills will be noted. Your name will not be written in the notes. The research report will use pseudonyms (fake names) to protect your privacy.

Voluntary Participation and Withdrawal

You do not have to be in this study. You may stop participating at any time.

Contact Information

Contact Ashleigh Cox at +1(404)936-7992 and acox27@gsu.edu or Diane Belcher at dbelcher1@gsu.edu.

Consent

If you are willing to volunteer for this research, please sign below.

_____

Appendix G: Student Survey Consent Form

Georgia State University

Informed Consent

Title: Writing about Research in Respiratory Therapy: Comparing Published Research Articles and Master's Theses and Exploring the Academic Literacy Writing Challenges of Graduate Students

Principal Investigator: Diane Belcher

Student Principal Investigator: Ashleigh Cox

Procedures

You are being asked to take part in a research study. If you decide to take part, you will complete an anonymous online survey that will take about 20 minutes of your time. The survey will ask about your academic reading and writing experiences and challenges. It will also ask about your English language background and learning experience. The survey will be completed in 2023.

Voluntary Participation and Withdrawal

You do not have to be in this study. You may skip questions or stop participating at any time.

Contact Information

Contact Ashleigh Cox at +1(404)936-7992 and acox27@gsu.edu or Diane Belcher at dbelcher1@gsu.edu.

Consent

If you are willing to volunteer for this research, please start the survey.

Appendix H: Faculty Individual Interview Consent Form

Georgia State University

Informed Consent

Title: Writing about Research in Respiratory Therapy: Comparing Published Research Articles and Master's Theses and Exploring the Academic Literacy Writing Challenges of Graduate Students

Principal Investigator: Diane Belcher

Student Principal Investigator: Ashleigh Cox

Procedures

You are being asked to take part in a research study. If you decide to take part, you will be interviewed virtually for about an hour on Zoom. The study is about writing academic research articles in your discipline. There will be questions about academic literacy skills that students need for your program. There will also be questions about common academic literacy challenges you have seen and ways to help students. The audio will be recorded and transcribed. To protect your privacy, your name will not be included in the transcriptions, filenames, or report of the study. The interview will take place in 2023.

Voluntary Participation and Withdrawal

You do not have to be in this study. You may skip questions or stop participating at any time. After the interview, if you change your mind about participating, you can withdraw from the study, and your recording will be deleted. You can also request for sentences to be deleted from the transcript if you change your mind about information you want to share.

Contact Information

Contact Ashleigh Cox at +1(404)936-7992 and acox27@gsu.edu or Diane Belcher at dbelcher1@gsu.edu.

Consent

If you are willing to volunteer for this research, please sign below and begin the interview.

Appendix I: Student Interview Consent Form

Georgia State University

Informed Consent

Title: Writing about Research in Respiratory Therapy: Comparing Published Research Articles and Master's Theses and Exploring the Academic Literacy Writing Challenges of Graduate Students

Principal Investigator: Diane Belcher

Student Principal Investigator: Ashleigh Cox

Procedures

You are being asked to take part in a research study. If you decide to take part, you will be interviewed by Ashleigh Cox on Zoom. The interview will focus on your academic reading and writing experiences and challenges. There will be questions about reading and writing difficulties and ways that you overcome these difficulties. There will also be questions about writing a master's thesis. The interview will take about an hour. The audio will be recorded and transcribed. Your name will not be included in the transcriptions, filenames, or report of the study. The interview will take place in 2023.

Compensation

If you participate in this study, you can receive a $20 e-gift card and some writing help in return. With your instructor's permission, you can ask for feedback on one of your writing assignments. If you choose not to participate, you can ask for writing help from the GSU writing studio instead.

Voluntary Participation and Withdrawal

You do not have to be in this study. You may skip questions during the interview or stop participating at any time. After the interview, if you change your mind about participating, you can withdraw from the study, and your recording will be deleted. You can also request for sentences to be eliminated from the transcript if you change your mind about information you want to share.

Contact Information

Contact Ashleigh Cox at +1(404)936-7992 and acox27@gsu.edu or Diane Belcher at dbelcher1@gsu.edu.

Consent

If you are willing to volunteer for this research, please sign below and begin the interview.

Appendix J: Answers to survey questions about what was helpful in English courses

Question	Responses (number of respondents selecting option)
To what extent did the skills that you learned in English courses help prepare you for reading in your respiratory therapy classes?	Not at all: 0 A little: 10 Enough: 20 A lot: 8
To what extent did the skills that you learned in English courses help prepare you for writing in your respiratory therapy classes?	Not at all: 0 A little: 8 Enough: 8 A lot: 13
What skills that you learned in your English courses have been helpful in your respiratory therapy studies? (open response question)	Speaking: 4 Listening: 1 Reading: 8 Writing: 5 Skimming:1 Scanning: 1 Structure of papers: 1 Vocabulary: 1 Summarizing: 1 Looking for thesis statement: 1 Looking for key words: 1
What skills that you learned in your English courses helped prepare you for reading research articles?	Identifying main ideas: 17 Recognizing author's tone: 6 Knowing the type of information to expect to find in each section of a research article: 9 Skimming strategies: 15 Scanning strategies: 8 Understanding academic vocabulary: 13 Figuring out the meaning of words using the context: 8 Reading quickly: 10
What skills that you learned in your English courses helped prepare you for writing research articles?	Organization/Knowing what type of information should go in each section of a research paper: 15 Explaining your ideas clearly: 14

	Connecting your ideas: 12 Finding academic sources: 11 Using academic sources to support your ideas: 14 Paraphrasing information from sources: 13 Grammar skills: 13 Other: none (1)
Did your English courses adequately prepare you for paraphrasing information from academic sources and integrating the information into your writing?	Yes: 24 No: 7
Did you learn how to write annotated bibliographies in your English courses?	Yes: 11 No: 20