Establishing a niche in respiratory therapy research: Comparing novice and expert writing

Ashleigh Cox[1] **& Eric Friginal**[2]
Georgia State University (United States)[1], The Hong Kong Polytechnic University (Hong Kong SAR, China)[2]
acox27@gsu.edu, eric.friginal@polyu.edu.hk

Abstract

This study examines the phrases used to highlight research gaps in writing in the respiratory therapy discipline. A corpus of respiratory therapy research article introductions was compiled, and words and phrases associated with signaling research gaps were searched. To compare expert and student writing, the same phrases were searched in a corpus of thesis introductions written by respiratory therapy master's students. To look for other ways of expressing research gaps, a subset of 52 articles was examined. The expressions of research gaps were identified, and the phrases for expressing gaps were examined qualitatively to find common themes. Out of the words and phrases searched automatically, the words *however*, *but*, *limited*, and *need* were common, but many devices for highlighting gaps that were noted in previous studies were not frequent in either corpus. Master's students used the phrases *no studies*, *need*, and *must* significantly more than published authors. Outside of the words and phrases searched, the expressions used to describe gaps were quite varied. To describe research gaps, authors mentioned limited research, criticisms of previous research, or challenges in researching the topic of interest. To describe practice or training gaps, authors described burdens on the healthcare system, lack of knowledge among professionals, criticisms of respiratory therapy curricula, shortages of training programs, lack of guidelines or consistency in practice, treatment challenges and risks, and other practical problems that the study aimed to address. These findings have pedagogical implications for the phrases that students in this discipline should learn for highlighting gaps.

Keywords: Academic writing, discipline-specific corpora, move-analysis, English for medical purposes, disciplinary rhetoric.

Resumen

Estableciendo un nicho en la investigación sobre terapia respiratoria: Comparación entre la escritura de principiantes y expertos

Este estudio examina las frases utilizadas para resaltar vacíos de investigación en la redacción dentro de la disciplina de terapia respiratoria. Se compiló un corpus de introducciones de artículos de investigación de terapia respiratoria y se buscaron las palabras y frases asociadas con la señalización de vacíos de investigación. Para comparar la escritura de expertos y de estudiantes, se buscaron las mismas frases en un corpus de introducciones de tesis escritas por estudiantes de máster en terapia respiratoria. Para identificar otras formas de expresar vacíos de investigación, se examinó un subconjunto de 52 artículos. Se identificaron las expresiones de vacíos de investigación y se analizaron cualitativamente las frases utilizadas para encontrar temas comunes. Entre las palabras y frases buscadas automáticamente, las palabras *however*, *but*, *limited* y *need* son comunes, aunque muchos recursos para resaltar vacíos señalados en estudios previos no son frecuentes en ninguno de los dos corpus. Los estudiantes de máster utilizaron significativamente más las expresiones *no studies*, *need* y *must* que los autores de artículos. Más allá de las palabras y frases buscadas, las expresiones utilizadas para describir vacíos fueron bastante variadas. Para describir vacíos de investigación, los autores mencionaron la existencia de investigaciones limitadas, críticas a estudios previos o desafíos relacionados con la investigación del tema de interés. Para describir vacíos en la práctica o en la formación, los autores señalaron cargas sobre el sistema de salud, falta de conocimiento entre profesionales, críticas a los planes de estudio de terapia respiratoria, escasez de programas de formación, falta de directrices o consistencia en la práctica, desafíos y riesgos en el tratamiento y otros problemas prácticos que el estudio pretendía abordar. Estos resultados tienen implicaciones pedagógicas respecto a las frases que los estudiantes de esta disciplina deberían aprender para resaltar vacíos de investigación.

Palabras clave: Escritura académica, corpus de disciplinas específicas, análisis de movimientos discursivos, inglés con fines médicos, retórica disciplinar.

1. Introduction

English has been used as a lingua franca for researchers around the world in many academic disciplines, and respiratory therapy, a branch of healthcare that focuses on issues related to breathing, is no exception. Journals such as *Respiratory Care* and *Respiratory Research* publish research from universities and

hospitals in many different countries, and authors from a diverse array of language backgrounds share their research findings with an international discourse community in English. Additionally, many international students come to the United States (US) to study respiratory therapy in English-medium programs (AbuNurah et al., 2020), and in respiratory therapy training programs around the world, English is often required to secure a degree. As seen in other academic disciplines, English has an important role in connecting to the international respiratory therapy discourse community, and linguistic research on discipline-specific communication patterns could offer writing teachers valuable information. However, the research in communication in respiratory therapy is very limited.

As a starting point, analyzing the rhetorical structure of respiratory therapy writing can provide useful implications for teaching discipline-specific writing in this field. Although rhetorical organization in writing may seem like an abstract concept, researchers have identified common, teachable rhetorical patterns in academic writing, particularly in research articles (Kanoksilapatham, 2005). To complement research on the overarching structure of research articles, some researchers using "top-down" (Biber et al., 2007) approaches have focused on specific linguistic features that are commonly found in each organizational unit of research papers with functions contributing to organizational cohesion (Cortes, 2013). This type of work can be helpful because it provides writing teachers with specific lexical or grammatical features with organizational functions that can be introduced alongside broader organizational frameworks to give students a toolkit for cohesion. The step of highlighting research gaps to convince readers of the need for a study is a very important feature of successful research article writing (Stosic, 2022), particularly in the field of respiratory therapy (Branson, 2004). Although many studies (e.g., Cortes, 2013) have explored features used to highlight gaps in research articles, because writing norms vary across disciplines (Bruce, 2008; Lu et al., 2021; Swales & Feak, 1994) and are likely to evolve over time (Atkinson, 1992; Bazerman, 1983; Li & Ge, 2009), exploring the rhetorical patterns specifically in respiratory therapy is worthwhile, particularly in how novice and expert writers perform the crucial step of justifying the need for a study.

2. Literature review

2.1. Swales's foundations

Much of the work systematically examining the organizational structure of academic research articles has followed the model of John Swales (1990, 2011), and his framework offers a useful starting point for exploring rhetorical features in respiratory therapy writing. His move-analysis approach has helped academic writing researchers provide discipline-specific organizational frameworks that can be taught to novice writers (see Chang & Kuo, 2011 for computer science; Kanoksilapatham, 2005 for biochemistry; Ozturk, 2007 for SLA and L2 writing). Different approaches to move analysis have been used, but generally, a subset of texts from a specialized corpus is examined for the overall organizational structure, the function of each segment of the texts is determined, functional-semantic themes are identified and categorized as "steps", and the move-step scheme drafted is verified in the other texts in the corpus, making revisions as needed (Kanoksilapatham, 2007). Laying the foundations for understanding the organization of research articles, Swales (1990, 2011) gathered a small corpus of research articles from various disciplines within broader categories of hard sciences, biology and medicine, and social sciences and looked for common communicative functions in the introduction sections. He identified common rhetorical "moves" and "steps" within each move, which are outlined in Table 1, and noted how many articles in his corpus utilized each move and step. In the beginning of article introductions, he found that writers tend to situate their work in the previous literature of their field, either by making general statements about the topic and/or its importance, discussing the findings of previous studies, or both. After establishing that the topic is relevant to the field, authors tended to point out a gap in the research that their study would fill by criticizing previous research or its limitations, mentioning work that has not yet been undertaken, or posing questions. After describing a gap in the research, authors indicate that their present study addresses the gap by giving an overview of the study or its purpose and possibly its findings. Some authors end their introduction with an overview of how the paper is organized.

Move 1	Establishing a territory
Step 1	Making claims about centrality and/or
Step 2	Making generalizations about the topic and/or
Step 3	Reviewing previous work
Move 2	**Establishing a niche**
Step 1A	Counterclaiming or
Step 1B	Indicating a gap or
Step 1C	Question-raising
Step 1D	Continuing a tradition
Move 3	**Occupying the niche**
Step 1A	Outlining purposes of the study or
Step 1B	Announcing the present research
Step 2	Announcing principal findings of the study
Step 3	Indicating the structure of the paper

Table 1. Swales's (1990) communicative functions of research article introductions.

Although much pedagogical material has been developed as a result of Swales's work, and following his model is recommended by many university libraries and writing centers (e.g., Purdue Online Writing Lab, 2022; UMass Amherst Writing Center, 2023; USC Libraries, 2023), it has considerable limitations, such as subjective coding and a small sample of texts. However, these limitations have inspired many other studies on writing academic research articles. Since Swales's sample of texts was small, and at this point it may be outdated, other studies have sought to check if Swales's descriptions fit other corpora of research articles (e.g., Ozturk, 2007). Table 2 compares the trends observed in multiple studies, including Nwogu's (1997) move analysis of medical research articles and Cortes's (2013) more recent move analysis of research articles from multiple disciplines.

Swales (1990)	Swales (2011) [1981]	Nwogu (1997)	Cortes (2013)[a]
Establishing a territory	**Establishing the field + Describing/ Summarizing previous research**	**Presenting background information**	**Establishing a territory**
Making claims about centrality and/or	Showing centrality	-	Claiming centrality
Making generalizations about the topic and/or	Ascribing key characteristics	-	Making topic generalization/s
Reviewing previous work	Stating current knowledge Describing/summarizing previous research	Reviewing related research, reference to established knowledge	Reviewing items of previous literature
-	-	Reference to the main research problem	-
Establishing a niche	**Preparing for present research**	**-**	**Establishing a niche**
Counterclaiming	-	Reference to limitations of previous research	-
Indicating a gap	Indicating a gap	-	Indicating a gap
Question-raising	Question raising	-	-
Continuing a tradition	Extending a finding	-	Adding to what is known
Presenting positive justification	-	-	Presenting positive justification
Occupying the niche	**Introducing present research**	**Presenting new research**	**Presenting the present work**
Outlining the purposes of the study or	Giving the purpose	Reference to research purpose	Announcing present research descriptively and/or purposively. Presenting research questions or hypotheses
-	-	-	Definitional clarifications
Announcing the present research	Describing the present research (no reference to the purpose)	Reference to the main research procedure	Summarizing methods
Announcing principal findings of the study	-	-	Announcing principal outcomes
-	-	-	Stating the value of the present research
Indicating the structure of the paper	-	-	Outlining the structure of the paper

[a] Cortes utilized an adaptation of a combination of Swales's earlier and later model.

Table 2. Aligning different move schemes describing similar trends.

2.2. The importance of Move 2: "Establishing a niche"

Out of the moves in research article introductions that Swales and others have described, a move that plays an essential role in convincing readers of the importance of a study is "establishing a niche" by highlighting a gap in the literature or otherwise showing readers the need for the study. This move creates a "demand" for this particular study (Shehzad, 2008, p. 26), so that the readers understand its importance. Identifying the specific strategies used to craft this move may be informative for students (Sun & Crosthwaite,

2022). Students are often not yet prominent in their fields, which makes it important to convince readers of the value of their research. For these reasons, exploring the ways to argue a "niche" successfully could have pedagogical value. However, studies on ways to express this move using corpora from different disciplines have described different patterns (see Moghaddasi & Graves, 2017, pp. 70-71, for a comparison of how this move is carried out in different disciplines), and it should not be assumed without empirical evidence that what is known about writing this move from studies on academic writing in other disciplines is applicable to writing in respiratory therapy.

2.3. Linguistic features in each move

Some studies have sought to identify features that are frequently found within specific moves, using what Biber et al. (2007) refer to as "top-down" approaches. Revealing features used in each move and step can help teachers provide students with specific guidance and aid in the development of automated move analysis tools by offering lists of computer-searchable linguistic features. If detailed "rubrics" outlining characteristics of each step are developed with manual analysis of texts, the findings can be used to develop computerized move coding tools (Kanoksilapatham, 2007), and they are also useful for pedagogical purposes. Swales (2011) [1981] indicated some common words, phrases, and grammatical structures used to perform the communicative functions within rhetorical moves. For example, in the first move of establishing the field, he noted the words *importance* and *interest* and the phrases *a classic problem*, *favourite topics*, and *has been studied by many authors*, and the present simple or present perfect was used when discussing the current state of the research in his sample of texts. Although there are some commonalities across papers, there are some rhetorical functions that are difficult to generalize. For example, Swales (1990) noted that many introductions contain reporting verbs in the step for reviewing previous literature, but there are many possible reporting verbs to choose from in three common tense/aspect combinations (simple past or present or present perfect), and the choice is largely influenced by the author's stance towards the information cited. Such variation may make it difficult to write a script to automatically identify the prevalence of this step in a corpus or offer clear guidance to students.

Skelton (1994) and Nwogu (1997) mention some linguistic features like tenses and aspects found in each move, but not enough features were

mentioned to develop an accurate move-identification program. Cortes (2013) offers more promising findings. She examined lexical bundles appearing in each move in introductions from the Published Research Article Corpus (Gray & Cortes, 2010), a corpus of research articles from different disciplines. She found that lexical bundles that were longer than five words tended to be used at the beginning of move transitions, and shorter lexical bundles "complimented" these move "triggers". As the corpus used in Cortes's (2013) study contained more texts than Swales's (1990, 2011) corpus, the lexical bundles identified could provide a helpful base for developing automated move analysis tools.

Given the importance of arguing for the need for a study, identifying features that can be used for the step of establishing a niche can be particularly helpful for students. Features that have been explored for this step include the lexical bundles *it is necessary to* and *the effect of the* (Cortes, 2013, see the complete article for lists including less frequent examples), other words relating to necessity (Swales, 1990), conjunctions and conjunctive adverbs showing contrast (Skelton, 1994; Swales, 2011), and negation (Swales, 1990; Sun & Crosthwaite, 2022). Table 3 outlines the computer-searchable features that have been associated with highlighting research gaps. However, as unique patterns have been identified in discipline-specific corpora (Chang & Kuo, 2011; Kanoksilapatham, 2005; Ozturk, 2007) and disciplinary variation in rhetorical moves and steps have been observed (Lu et al., 2021; Moghaddasi & Graves, 2017), it is important to confirm whether these features are commonly found in respiratory therapy articles.

3. Corpus-based study: Comparing novice and expert writing

3.1. Objectives of the study

The previous research using Swales's (1990, 2011) techniques has led to useful, discipline-specific information about the organization of research articles that has been informative for EAP teachers. However, there is still limited information about the rhetorical structure of writing in the respiratory therapy discipline. To address this gap, we compiled a discipline-specific corpus of published research articles and searched for features identified in previous studies as contributors to the rhetorical organization of

research papers using Python. We compared a corpus of writing samples from graduate students with writing from disciplinary experts. Since Swales's Move 2 (establishing a niche) is especially important for writers to communicate the importance of their study, this study only examined features relevant to Move 2. The following research questions target the aims of this study:

1. To what extent are common phrases for establishing a niche used in the respiratory therapy discipline?
2. In comparison to expert writers, to what extent do novice writers utilize these phrases?
3. What other phrases do expert writers in respiratory therapy use to establish a niche?

The methods used to address these questions are outlined below, and implications for pedagogy, research, and software development are discussed.

3.2. Methods

3.2.1. Corpora

Two corpora of respiratory therapy writing were compiled. Each corpus contained 80 texts representing respiratory therapy writing, one corpus representing disciplinary writing at a professional level and the other corpus representing disciplinary writing at a graduate student level. The research article corpus, representing expert writing, was composed of introduction sections extracted from empirical articles from *Respiratory Care*, *Respiratory Research*, *Respiratory Care Education Annual*, and *CHEST*. These peer-reviewed journals were chosen based on the recommendations from eight university respiratory therapy instructors to ensure that the sample adequately represented high-quality writing in that discipline. As the instructors consider these journals to be highly esteemed, credible journals that they read, publish in, and try to help students publish in, they were considered to be good sources of texts that are representative of their discourse community for this study. The corpus contained 36,052 words. Articles included in the corpus were the most recently written (at the time each journal was consulted for corpus compilation) empirical papers (excluding meta-analyses) available for download. Since *CHEST* publishes research articles relating to both the lungs and the heart, only

the articles relating to respiratory therapy were included in the corpus (using the journal's categorization of papers); cardiology research articles were excluded. Most of the articles were published in 2022 or 2023, but publication dates of articles from *Respiratory Care Education Annual* ranged from 2019-2022 because of the number of empirical texts available at the time of corpus compilation.

Theses are useful samples of student writing to compare to expert writing (Hyland, 2008). Like journal articles, they report on empirical research and are reviewed before becoming available to the public. The thesis corpus, representing graduate student writing, contained introduction sections of theses written by students in respiratory therapy masters' programs. As thesis introductions can be longer than journal article introductions, the thesis corpus contained 98,269 words. In spite of the length, the number of research gaps mentioned in theses and research articles were comparable. Much of the difference in length is due to longer Move 1 sections and additional pieces such as lists of terminology, research questions, and assumptions underlying the study design. Shorter research papers would be ideal for comparison, but it was not feasible to collect large enough samples of student research papers and the length did not contribute to the number of times research gaps were mentioned in the introductions. For these reasons, the limitations of using theses were accepted for this study. Theses were downloaded from ScholarWorks and other similar websites (e.g., OhioLink), and because of limited access to theses, a convenient sample of theses accessible through university library subscriptions was utilized; 68 out of 80 theses were from a single university, and thesis completion dates ranged from 2009-2023. As there are many publishing respiratory therapy authors who have at some point written a master's thesis, and studies that start as masters' theses are sometimes revised and published as research articles, care was taken to ensure that the texts in the RA corpus did not have a first author of any of the texts in the thesis corpus.

3.2.2. Comparing Move 2 features

The Python script written to compare Move 2 in expert and graduate student writing searched words and multi-word units identified by Swales (1990, 2011), Skelton (1994), and Cortes (2013), using the features from steps that closely align with Swales's (1990) descriptions in cases where the move-schemes used by other researchers did not match exactly (see Table 2 above). Searchable features reported to appear frequently in more than one move (in addition to move 2) were not included in the script, as they could be performing functions

other than highlighting research gaps. For example, Cortes (2013) identified many lexical bundles that appear in more than one move, and while these are useful for manually identifying moves and have practical pedagogical value, they were not included in the search scripts. Similarly, tenses and aspects identified by Nwogu (1997) were excluded from the script, as the same tense/aspect combinations commonly appear throughout introductions. Additionally, frequency information was taken into account when available; only the most frequent features (listed in Table 3) of Swales (1990) and Cortes (2013) were included, but the frequencies of some of the examples listed in Swales's (1990, 2011) descriptions are not given. Out of Cortes's lexical bundle list, only the bundles that occurred in at least 20 texts from her corpus of 1,372 texts were included in the analysis, as they were hypothesized to be more likely to be found than the bundles occurring in only a few texts. This cutoff value was determined to allow for the inclusion of some bundles while excluding bundles that are not likely to be generalizable to the corpora in this study. *It is necessary to* occurred in 29 texts in her corpus, and *the effect of the* occurred in 27 texts in her corpus. In Swales's (2011) analysis, indicating a gap occurred in 20 out of 48 texts, while question-raising occurred in 14 out of 48 texts. As the frequencies of specific searchable features were not mentioned in his report, all of the features mentioned that could perform these common Move 2 functions were searched. Table 3 lists the features that were included in the search script based on these criteria. Note that no features for Step 1C were included because no features meeting the criteria were found in the literature on academic writing, perhaps because this step is generally less common.

Author	Step 1A: Counterclaiming Step 1B: Indicating a gap	1D: Continuing a tradition
Features identified by Swales (2011) [1981]	**Expressions of contrast**: *however, but, nevertheless, though* **Nominal negative elements**: *little (attention, attempt, work), no (studies, calculations, data), none of (these reports, the studies, the previous studies), very few investigations* **Verbal negative elements**: *does not show, are not given, has not been understood, is ill understood* **Lexical/adverbial negative elements**: *only (a part of this, values are known), more data are required, his* [the pronoun was dropped to allow for the possibility of *her* and *their*] *attempts… were unsuccessful, has failed, both failures, the failures of these studies, lacks the detail, most studies have been content to*	N/A
Features identified by Swales (1990)	*however, nevertheless, yet, unfortunately, but, need* *suffer, is limited to, cannot treat, fail, time-consuming, expensive, not sufficiently accurate, inconclusive, complex, misleading, elusive, scarce, limited, questionable, questions*	*Need, must* (to indicate only possible explanation)
Features identified by Skelton (1994)	*but, however, nevertheless, little is known*	N/A
Lexical bundles identified by Cortes (2013)	*it is necessary to, the effect of the*	N/A

Table 3. Move 2 features searched.

3.2.3. Manual inspection of the words and phrases

To ensure that occurrences of the words and phrases performing functions that are not related to Move 2 (establishing a niche) were excluded in the comparison, the uses of these words were manually examined, and texts utilizing non-Move 2 functions of the target features were subtracted from the text count before comparing their frequency in graduate student and professional writing. Both AntConc (Anthony, 2019) and Python were utilized for the manual analysis, as AntConc has the advantage of outputting color-coded reader-friendly concordance lines, and Python has the advantage of the ability to print entire texts when more context is needed to determine the function of the words. Since many of the research topics in the field of respiratory therapy are related to practical treatments, often the gap highlighting observed identified a need for research based on problems with currently used treatments or procedures rather than gaps in the literature, as in (1):

> (1) Tracheostomy is a common procedure performed in critically ill patients... However, tracheostomy is associated with several complications and increased morbidity and mortality. (Alhashemi et al., 2022, p. 34)

Cases like these and other such uses highlighting treatment or practical issues rather than direct research gaps were included in the list of texts containing Move 2 features, as they contribute to the authors' niche establishment. There were also some instances of words being used differently than what had been reported in previous studies, but still contributing to Move 2 functions. In particular, the word *must* was described by Swales (1990) as being used to build logical arguments in Step D, but in the thesis corpus, it was sometimes used for a Step B function (information that "must" be added to the existing body of literature), and these were counted as occurrences that contributed to Move 2.

3.2.4. Searching for other Move 2 phrases

In addition to the phrases that have been noted in previous literature, the RA corpus was examined to find other phrases used to establish a niche outside of what can be expected based on previous studies. Although corpus-driven studies tend to use quantitative approaches, great variability was observed in the linguistic features used to perform Move 2 in the data, and for this

reason, qualitative, semantic analysis of the ways to establish a niche was performed instead of automatic extraction of linguistic features. First, in a subset of 52 research articles, the parts of introductions that performed Move 2 were separated. Next, the phrases used for Move 2 in each example were listed. These phrases were examined and categorized based on meaning (e.g., limitations in research, limitations in training, limitations in treatment, etc.). After forming broad categories, the phrases were divided into more specific categories (e.g., phrases for highlighting limitations in previous literature, phrases to express high cost of treatment options, etc.). Recurrent words and grammatical structures in these phrases were also noted.

3.2.5. Statistical analysis

To test if there was a significant difference between the number of texts containing each Move 2 feature searched in the RA and thesis introduction corpora, tests of proportions were conducted. Tests of proportions were selected for comparing the use of typical Move 2 features because of their suitability for non-continuous data, as the presence or absence of each feature rather than the frequency of each feature was counted for each text. Separate tests were done for each feature, and the tests were performed using an online calculator (Social Science Statistics, 2023). When significant differences were found, Cohen's *h* was calculated using Excel to determine the effect sizes.

4. Results and discussion

4.1. Research question 1: Prevalence of features and words noted in previous literature

The resulting number of texts containing each Move 2 feature that occurred in the RA and thesis corpora are summarized in Table 4. *However* and *but* were especially common in these corpora. While many of the features that previous research has identified as being used to perform Move 2 functions were present, there was a notable number of features that did not appear in the corpora examined in this study. Namely, the strings *elusive, questionable, not sufficiently accurate, most studies have been content to, lacks the detail, the failures of these studies, both failures, attempts have failed, attempts were unsuccessful, more data are required, only values are known, only a part of this, is ill understood, has not been*

understood, are not given, does not show, very few investigations, none of the previous studies, none of the studies, none of these reports, no calculations, little work, little attempt, and *little attention* did not appear in either corpus, in contrast to previous studies.

Features	RAs using feature for Move 2	Theses using feature for Move 2
however	41 (51.3%)	48 (60%)
but	14 (17.5%)	23 (28.8%)
nevertheless	2 (2.5%)	6 (7.5%)
though	1 (1.3%)	6 (7.5%)
no studies	1 (1.3%)	7 (8.8%)
no data	1 (1.3%)	1 (1.3%)
it is necessary to	1 (1.3%)	1 (1.3%)
little is known	0 (0%)	2 (2.5%)
is limited to	0 (0%)	1 (1.3%)
cannot treat	0 (0%)	0 (0%)
time consuming	1 (1.3%)	0 (0%)
yet	7 (8.8%)	6 (7.5%)
unfortunately	4 (5.0%)	5 (6.3%)
need	8 (10.0%)	47 (58.8%)
suffer	1 (1.3%)	0 (0%)
fail	1 (1.3%)	1 (1.3%)
expensive	3 (3.8%)	4 (5.0%)
inconclusive	0 (0%)	2 (2.5%)
complex	6 (7.5%)	1 (1.3%)
misleading	1 (1.3%)	0 (0%)
scarce	0 (0%)	2 (2.5%)
limited	10 (12.5%)	14 (17.5%)
questions	3 (3.8%)	1 (1.3%)
must	1 (1.3%)	7 (8.8%)
the effect of the	0 (0%)	0 (0%)
it is necessary to	1 (1.3%)	2 (2.5%)

Table 4. Number of texts utilizing Move 2 features.

There were many occurrences of *question* or *questions* in the thesis corpus, but few performing Move 2 functions. This trend was observed because many theses in the corpus contain explicitly labeled research questions, which accounted for most of the occurrences of that lemma and fit in Move 3 rather than Move 2.

As displayed in Table 4, a total of 20 of the Move 2 features searched appeared in the corpus of published research articles, and the words/multi-word units occurring in many texts (*however, but, need*) may be relevant to establishing a niche in introductions in respiratory therapy. The word *however* has been noted as a common word for this move in previous studies (Suryani et al., 2015; Swales, 2011), and Cortes (2013) describes how the word *however* can be used to introduce Move 2. This word may be seen by writers as a useful link between the discussion of previous research and the need for a new study, and the contrast implied by this word is particularly useful for indicating a caveat related to the previous research, as seen in (2):

(2) In the INCREASE study, higher doses of iTre were associated with greater improvements in 6MWD. **However**, it is unknown whether higher doses of iTre in patients with PH resulting from ILD are associated with other benefits such as decreased rates of clinical worsening. The goal of this post hoc analysis therefore was to evaluate whether patients achieving higher doses did indeed demonstrate better outcomes (…). (Nathan et al., 2023, Research Article Corpus)

Surprisingly, many of the previously identified features and sequences for highlighting gaps were not observed, or were observed in very few texts, pointing to the need for more discipline-specific research. Cotos et al. (2024) found disciplinary variation in lexical bundles used for rhetorical moves, and this disciplinary variation could be one explanation for the absence of some of the phrases for Move 2 that were noted in previous studies. Each academic discipline can be considered a distinct discourse community capable of developing unique communication norms (Hyland, 2000), and based on the absence of typical Move 2 features in this data, it appears that there is some uniqueness to the ways to establish "niches" in respiratory therapy. There are also many options for performing the rhetorical function of Move 2 in academic English in general. In Cortes's (2013) study on lexical bundles in each move, 4 lexical bundles were found for the step of indicating a research gap, but they did not appear in a substantial number of texts (see her Appendix A), indicating that there may be multiple other ways to express this idea.

An interesting quality of Move 2 that was observed in many of the texts in both corpora is that the niche was often established in relation to practical, real-world issues or policy and treatment gaps rather than research gaps, and the niche was often supported by information in Move 1 about the scope of the disease or problem discussed. For example, rather than identifying limitations of previous studies, many authors identified limitations of current treatment options to justify the need for research on newer possibilities, as seen in excerpt (3):

(3) Venoarterial (VA) extracorporeal membrane oxygenation (ECMO) has become commonplace in pediatric cardiac ICUs as a vital intervention used to support children with cardiac failure. The invasive nature of VA ECMO, **however**, along with its requirement for systemic anticoagulation, place children at risk for complications, including coagulopathy, hemorrhage, and limb ischemia, which have been shown to be associated with an increased risk of mortality and long-term morbidity. (Abou Nader et al., 2023, Research Article Corpus)

In (3), *however* is used to signal the caveats of ECMO, and the authors use this to justify the need to evaluate the scope of the problem and identify patient characteristics associated with ECMO complications. These types of variations of the traditional Move 2 pattern were also noted by Swales (2011), but more discipline-specific data could offer further insight into this phenomenon, as many respiratory therapy articles relate very directly to practical issues.

4.2. Research question 2: Comparing graduate student and professional writing

The Move 2 words and phrases were compared in the student and expert corpus. Table 5 summarizes the results of the tests of proportions comparing the number of texts containing each Move 2 feature in the RA and thesis corpora (excluding the features that were used in the same number of texts in each corpus). There were significant differences in the use of three features. *No studies* was used more in masters' theses than in published RAs, $z = -2.81$, $p = .02926$, with a small effect size ($h = -0.31$). It was very rare in the published RA corpus. Similarly, although the word *need* was relatively frequent in both corpora, it was used to perform Move 2 functions in more theses than research papers, $z = -6.49$, $p < .00001$, with a large effect size ($h = -1.11$). It was more difficult to objectively distinguish between Move 2 and non-Move 2 functions of the word *need* than it was for other words and phrases, but even the total number of texts containing that word show an over-use of *need* by the novice writers. *Must* was also significantly overused in masters' theses in comparison to published research articles, $z = -2.18$, $p = .02926$, to the same degree as *no studies* ($h = -0.31$).

Features	RAs using features for Move 2	Theses using features for Move 2	*z*	*p* value
however	41	48	-1.11	.267
but	14	23	-1.69	.09102
nevertheless	2	6	-1.45	.14706
though	1	6	-1.93	.0536
no studies	1	7	-2.18	.02926
the effect of the	0	1	-1.00	.31732
little is known	0	2	-1.42	.1556
is limited to	0	1	-1.00	.31732
time consuming	1	0	1.00	.31732
yet	7	6	0.29	.77182
unfortunately	4	5	-0.34	72786
need	8	47	-6.49	< .00001
suffer	1	0	1.00	.31732
expensive	3	4	-.39	.69654
inconclusive	0	2	-1.42	.1556
complex	6	1	1.93	.0536
misleading	1	0	1.00	.31732
scarce	0	2	-1.42	.1556
limited	10	14	-0.89	.37346
questions	3	1	1.01	.3125
must	1	7	-2.18	.02926
little is known	0	2	-1.42	.1556
it is necessary to	1	2	-0.58	.56192

Table 5. Test of proportions: Texts using move 2 features in RA and theses corpus.

One generalization that can be made from this list of overused phrases (*need, must,* and *no studies*) is that graduate students may be making bolder claims about the research gaps than expert writers (only one text in the RA corpus made the claim that *no studies* had addressed the topic investigated). The expert writers appear to prefer the softer gap-highlighting options, as seen in (4):

> (4) Two studies suggest that expeditious 6-zone examinations might be equally informative to their elaborate counterparts, but evidence in COVID-19 remains **limited**. (Heldeweg et al., 2023, Research Article Corpus)

Future research could investigate how students' bold claims about gaps would be perceived by readers. The topic of boldness of claims has also been explored in research on the use of hedges and boosters in student and expert writing, but it is not clear which group makes bolder claims. Crosthwaite, Cheung and Jiang (2017) found that expert writers in dentistry used a narrower selection of hedges and boosters than student writers, suggesting that some words or phrases may be more acceptable within the discourse community than others. More research into how claims are softened in respiratory therapy may be informative.

In addition to differences in the boldness of claims in the student and expert descriptions of gaps, the manual inspection of texts revealed that there were

a few cases of correct usage of gap highlighting devices in sentences that contained other academic style issues, such as vocabulary that is rare in a formal academic writing register (examples are not cited to avoid criticizing the writers, who may have advanced in their careers and no longer be "novice" writers). However, there is more to writing a reader-friendly Move 2 than simply using the expected phrases in the right place of the introduction, and other elements of successful writing can be addressed in academic writing classrooms in the form of individual writing feedback as needed. Although these differences were observed, there were many phrases used similarly by each group. In particular, the words *however*, *but*, and *limited* that were the most frequent gap indicators in the research article corpus were used at similar frequencies (i.e., not significantly different) by the student writers. This observation, along with the observed significant differences, may indicate that students have a partially developed sense of genre awareness. They use some words important to this genre appropriately, while overusing words that should be used with caution.

4.3. Research question 3: Other phrases for indicating gaps

Upon examining ways to perform Move 2 outside of the predetermined phrases that were searched, there was considerable variation in how authors chose to express the need for their studies. As seen in the analysis by Cortes (2013), many phrases were not repeated in more than a few texts. However, general semantic themes emerged, and there were a few repeated grammatical patterns in the excerpts examined. Table 6 displays phrases for each of the themes that were noted in the way that research article authors performed Move 2. As some articles cycled through this move multiple times (also observed by Swales, 2011), multiple quotes from the same article may be included in the table. For studies highlighting gaps in research, authors discussed limitations in the availability of research on a topic, procedures used in previous research, and specific components of research on the topic of interest, as well as general challenges in researching the topic. Alternatively, some authors highlighted the need for more research by stating the importance of the topic, the need for more information, the limited understanding of the issue, or discrepancies in the previous findings and debate in the field. Other authors focused on more practical gaps in training or treatment. In these texts Move 2 focused on highlighting burdens on the healthcare system, lack of training in a particular area or other criticisms of the field (knowledge gaps among practitioners, criticisms of curricula used,

training program shortages, or lack of guidelines), drawbacks of treatment options (difficulty of using them, issues that are difficult to detect, risks, lack of treatment options, or limitations of equipment) and long-term sustainability issues.

Semantic categorizations	Phrases used for indicating research gaps
Limitations in the literature	**Limited research on the topic:** *limited* + noun phrase (*evidence; research; studies; data*); *limitations include…*; *little evidence;* (*there is*) *no* + noun phrase (*evidence; studies; data*); there is + noun phrase (a gap in the literature for…; *lack of in vivo evidence*); (*a*) *few* + noun phrase (*data; studies; randomized clinical trials*); *only one study*; noun phrase (*data; the literature; the research*) + *is lacking*; *remain(s)* + subject predicative (*unknown; poorly understood; unclear; to be clarified; a key question; important to date*); *be* + adjective phrase (*unknown; unclear; poorly studied; scant; scarce*); *uncertainty exists regarding…*; *given the paucity of information about…*
	Limitations in the procedures: present perfect (*have addressed; have focused on; have been the subject of less research; have not rigorously assessed*); passive voice with perfect aspect (*have been equivocal at best, and in some cases even harmful; has almost exclusively been conducted in…; has yet to be characterized; has not been described; have also not been extensively described; has not been elucidated; have not been fully clarified; has not yet been validated*); modals with passive voice (*should be described and discussed; should be considered*); *they were unable to…*; *without considering*
	Specific limitations: *require(s)* + noun phrase (*more intensive investigation; objective evaluation with the monitoring of…*); modals + passive voice (*stronger evidence…must be evaluated; the results cannot be extrapolated to…; close attention to factors… may be indicated*); mentions of *bias* (*likely to be affected by…causality bias; most studies… which can induce … bias*); *as the prevalence of … increases, the rate of correct identification of ... decreases*; *small sample sizes*; *no longer significant after adjusting for…*
	Challenge in research: *it is difficult to evaluate*; *further complicating…*; *pose challenges*; *is not a simple task*
Need for research	**Importance:** *important to study*; *this is important because…*; *may serve as a favorable alternative*
	Need: *need information*; *a thorough investigation will be needed*; *it is necessary to clarify further*; *compels a closer examination*
	Limited understanding: *an understanding of … are needed*; *a better understanding of… is important*; *highlights the need for a better understanding of…*; *not completely understood; is incompletely understood*
	Debate or discrepancies in the literature: *remains* + adjective phrase (*controversial*); present perfect (*contradictory results have emerged*); passive present perfect (*has been a controversial issue/ a topic of much debate/ challenged/debated*); *we are led to question whether…*; *yielded results that were inconclusive at best*; *it is still debated if…*
Burden on healthcare system	**General:** *significant burden*; *given the burden of…*; *continue to place a strain*
	Cost: *account for the highest levels of hospital reimbursement*; *financial losses*; *increased cost*; *are expensive tests*; *shifts the burden, typically financial*; *high morbidity and healthcare costs*
Lack of training or education-related limitations or other criticisms of the field	**Knowledge and proficiency:** *respiratory therapy faculty may not be prepared… due to their own lack of ___ knowledge and experience*; *may not be aware*; *practicing respiratory therapists are not* + (*proficient; prepared*); *requires staff to remain proficient*
	Criticisms of curricula: *a discrepancy may exist* [between training and practice]; *lacking in the curriculum*; *not something that can be found in a book or simply taught in the classroom*; *devote a small portion of their curricula*; *tend to focus* [on limited topics]
	Shortage: (*There is/are*) *no* + noun phrase (*accredited entry-level programs; private healthcare providers*); *there remain several states which do not offer potential RTs access to an entry-level baccalaureate program*; *need for* + noun phrase; *attrition… is and forever will be a concern*; *suffers from a shortage of qualified respiratory therapists*; *does not have a formal respiratory therapy training program*; *a formal respiratory therapy program has not been established*; *has been predominantly dependent on foreign sources for respiratory therapy staffing*
	Inconsistent treatment and/or lack of guidelines: *significant variability in care*; *varies significantly*; *standards for...are not clearly specified*; *the manual does not include statements on…*; *lack of…protocol*
	Other issues: *goals have been difficult to fulfill*; *the failure of the profession*; *leading to...burnout*
	Challenges: *there is an urgent need*; *it is unclear*; *may be complicated by*; *often is difficult to define*; *is quite variable and complex for each patient*; *quite limited*; *with the limitation of*; *led to difficulties*; *results might not always correlate*; *makes implementation challenging*; *is a particularly challenging situation for clinicians*;

Drawback or limitation of available treatment options	*require continuous adjustment of the ventilation strategy*; *___ strategy might not be successful for all individuals*; *must balance competing interests*
	Issues that go undetected: *often go* + past participle (*undetected; unrecognized*); *may be overlooked*; *it can easily miss…*
	Risk: *increased* + noun phrase (*mortality; morbidity; risks*); *increasing…complications*; *associated with* + noun phrase (*severe complications and increased morbidity and mortality; significant lung restriction and impaired gas exchange*); *pose* + noun phrase (*risk; additional stress and strain on lung tissues*); *risk posed by*; *it also may be an important contributor to…*; *the major consequences of ____ are*
	Something is needed or missing: *No* + noun phrase (*clinically approve drugs, choice of location*); *lack of approved drugs for…*; *is needed*; *not available at all care levels*; *necessitating the need for*; *neither formally recognized nor easily available*
	Equipment limitations: *are still used*; *makes it inadequate*; *requires a power source*; *shortage of these resources*; *considerable waiting lists*
Sustainability problems	*neither ideal nor feasible as a long-term solution*; *is not sustainable*; *may not be sustainable in the long run*; *severe implications on the future trajectory*
Other problems in practice	*There is/are* + noun phrase (*concerns*, *a problem presently*); *perpetuating the issue*

Table 6. Semantic categorization of other phrases used to indicate research gaps.

In addition to these semantic patterns, a few recurring grammatical patterns were observed. Grammatical forms for stating the existence of problems, such as existential *there* and a copular verb (such as *remain*) were notable, as in the examples "there are concerns" and "treatment remains unclear". To describe limitations in the literature, present perfect was commonly observed, sometimes in the negative form or in combination with passive voice, as in the example, "Prior research has almost exclusively been conducted in the operating room setting" (Driver et al., 2023, Research Article Corpus). Incorporating phrases with "whether" into sentences about the research gap, as seen in the example "Whether and how pulmonary hypoperfusion is connected with COVID-19 are largely unknown" (Li et al., 2023, Research Article Corpus), was observed in 10 cases. *Whether*-clauses allowed writers to integrate the main topic of their research into the discussion of the gap, which may align with what Swales (2011) described as "question-raising". To introduce Move 2, in addition to the expressions of contrast noted by Swales (2011) [1981], *although* (used in 13 examples), *despite* (used in 9 examples), and *while* (used in 5 examples) were used. Moghaddasi and Graves (2017) found adversative conjunctions in general to be common for this function. In some cases, transition words that do not indicate contrast, such as *thus* and *therefore*, were also used to connect Move 2 to preceding sentences.

Although the examples in Table 6 do not contain the phrases noted in previous research, there are some ideas that overlap with descriptions in previous literature. Swales (2011) [1981] described the use of nominal negative elements (such as *no calculations*), verbal negative elements (such as *does not show*), and lexical/adverbial negative elements (such as *more data are*

required) in Move 2, and although the specific phrases he listed for these categories were not relevant in the RA corpus, other examples of these categories were seen. For example, *no evidence* fits into the nominal negative element category, *has not been described* fits into the verbal negative elements category, and *the literature is lacking* fits into the lexical/adverbial negative element category. Outside of these categories, there was little grammatical overlap in the phrases used in the RA corpus and the phrases used in previous literature, but semantically, the presence of research and practice gaps noted by Swales (2011) was very notable in this corpus. Additionally, although Cortes's (2013) lexical bundles were not frequent in this corpus, the semantic idea of her bundle *it is necessary to* was present in different phrases expressing a need. These findings suggest that the meaning of this move can be conveyed appropriately outside of formulaic sequences.

5. Conclusion

This study examined the ways to highlight research gaps in respiratory therapy, comparing an expert writer corpus of research article introductions and a student writer corpus of thesis introductions. By examining the corpora, the following conclusions can be drawn:

a) Few Move 2 phrases highlighted in previous studies are used to "establish a niche" in respiratory therapy introductions, with the exception of *however*, *but*, and *limited*.

b) In comparison to expert writers, student writers over-use the words *need, must,* and *no studies*, making bolder claims about the research gaps and need for their research.

c) The semantic categories of ways to establish a niche include limited amount of research, limitations in research methods, more specific limitations in previous research, research challenges, the importance of a study, a need for research, limited understanding, discrepancies in the existing literature, burden on the healthcare system, cost, knowledge or skill gaps of practitioners, criticism of training curricula, shortages, lack of guidelines or consistency, other criticisms of training or the field, treatment challenges, issues that can go undetected, risks, a lack of something, equipment limitations, sustainability issues, and other practice-related problems.

Some pedagogical implications can be drawn from the results. EAP teachers of respiratory therapy students can utilize some of the common vocabulary items (*however, but, yet*) when teaching students how to perform the "establishing a niche" move. They can also help students avoid over-using words like *must*, *need*, and *no studies*, and more broadly, help students notice the level of boldness that expert writers in their field use to describe research gaps. As some of the previously noted phrases did not appear in either corpus, they may not be pedagogically useful, but more research using other corpora would be needed to verify if that is generalizable to other respiratory therapy corpora. Additionally, some of the unused phrases may not necessarily strike readers as being inappropriate for the register or decrease the quality of writing, but phrases like *none of the previous studies* may be seen as too bold in today's academic writing. As phrases to highlight research gaps can be highly variable, teachers should emphasize the semantic categories of gaps, with examples of varying ways to express them academically.

There are also implications for the development of automated move analysis tools. It appears that updated research on the linguistic features found in each move could help software developers form more accurate programs. Words like *however* that rarely occurred outside of Move 2 may be helpful to include in move identification programs, whereas words like *must* that occur for other uses may be less prominent "triggers" (Cortes, 2013) of Move 2 and thus less useful for computer identification of move changes. The semantic categories of gaps may be useful for writing prompts for generative AI tools to recognize Move 2 examples. Additionally, more advanced programs can score sentences based on their likelihood of falling into each move, and thus incorporate features like tense, aspect, and position in the paragraph, which could not be used to distinguish moves without the support of other features.

Limitations of this study include the corpus size, which was a result of the lack of publicly available student writing samples. Use of theses in comparison to research articles is also not ideal, as theses are longer than research articles; moreover, our corpus contained a disproportionate number of theses from one university because of availability constraints. Another limitation is the subjectivity of categorizing which occurrences of each feature are truly performing Move 2 functions and which are not. Future studies could involve more raters to improve this process.

Based on the preliminary implications of this pilot study, more research in this area addressing the limitations would be worthwhile. Developing a better automated move analysis tool could be useful not only for respiratory therapy texts, but also for texts from other disciplines if an editable version of the script was shared to be adaptable to fit other academic discourse communities. More research in this area could lead to more practical findings to inform academic writing pedagogy in healthcare areas.

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Ashleigh Cox is currently a graduate student at Georgia State University. She researches English for Specific and Academic Purposes using corpus data. She is also interested in second language literacy. Her dissertation explores language patterns in respiratory therapy research articles and theses. In addition to research, she teaches English for Specific and Academic Purposes.

Eric Friginal is Professor and Head of the Department of English and Communication at The Hong Kong Polytechnic University. He specializes in applied corpus linguistics, technology and language teaching, and the analysis of spoken professional discourse in the workplace. His recent publications include *Global Aviation English Research* (2024) and *Teaching and Assessment in Global Aviation English* (2025), both co-edited with Malila Prado and Jennifer Roberts. He is founding co-editor-in-chief of *Applied Corpus Linguistics (ACORP) Journal.*