Research Article

An Exploration of the Scientific Writing Experience of Nonnative English-Speaking Doctoral Supervisors and Students Using a Phenomenographic Approach

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Nonnative English-speaking scholars and trainees are increasingly submitting their work to English journals. The study's aim was to describe their experiences regarding scientific writing in English using a qualitative phenomenographic approach. Two focus groups (5 doctoral supervisors and 13 students) were conducted. Participants were nonnative English-speakers in a Swedish health sciences faculty. Group discussion focused on scientific writing in English, specifically, rewards, challenges, facilitators, and barriers. Participants were asked about their needs for related educational supports. Inductive phenomenographic analysis included extraction of referential (phenomenon as a whole) and structural (phenomenon parts) aspects of the transcription data. Doctoral supervisors and students viewed English scientific writing as challenging but worthwhile. Both groups viewed mastering English scientific writing as necessary but each struggles with the process differently. Supervisors viewed it as a long-term professional responsibility (generating knowledge, networking, and promotion eligibility). Alternatively, doctoral students viewed its importance in the short term (learning publication skills). Both groups acknowledged they would benefit from personalized feedback on writing style/format, but in distinct ways. Nonnative English-speaking doctoral supervisors and students in Sweden may benefit from on-going writing educational supports. Editors/reviewers need to increase awareness of the challenges of international contributors and maximize the formative constructiveness of their reviews.

1. Introduction

Research findings are only as good as the quality of the scientific writing to describe them. Nonnative English-speaking scholars and their trainees are publishing increasingly in mainstream English language peer-reviewed academic journals. They are less content to publish in their native language journals, if they exist, or in the language of the country where they work or study. They opt to submit their work to English journals that are indexed and generally better known, disseminated, and accessed. These journals often with impact factors are also more prestigious when scholars and their trainees are being considered for promotion or admission to

graduate or postdoctoral fellowship programs and awards. The demand for excellence in scientific writing affects all writers, but this may be a particular burden for nonnative English-speaking scholars and trainees.

Editorial staff members of academic journals have attempted to facilitate the publication success of nonnative English-speaking contributors based on their perceptions of their needs. Editorials and articles on scientific writing have emerged aimed at these contributors [1–5]. These and articles on scientific writing generally tend to provide basic guidelines, for example, reiteration and elaboration of instructions for authors on format and style, and the conventional IMRAD format (i.e., introduction, methods, results, and discussion)

[6, 7]. Conceivably, the needs of nonnative English speakers are distinct [8–13]. Whether such articles address the specific needs of nonnative English-speaking authors is unclear. And whether these contributors would benefit from other types of supports also warrants elucidation.

Our primary research question was: do nonnative English-speaking doctoral supervisors and students have unique experiences with respect to English scientific writing? If so, can knowledge of their experiences inform educational supports to maximize their publication success and writing experiences?

Facilitating the scientific writing process for scholars and their trainees is no more important than at present. Global health trends and escalating health care costs have increased the demand for expedient and timely knowledge generation and translation across health professions. The transfer and dissemination of this growing knowledge base depend exclusively on the quality of the scientific written communication in English.

2. Method

2.1. Study Design and Approach.

A qualitative method based on a phenomenographic approach was used [14, 15]. The study was approved by the institutional ethical review board. Consent was provided by participants' agreeing to attend a focus group (supervisors or students).

Phenomenography aims to describe qualitatively the various ways in which people conceive phenomena in their unique worlds [16]. The investigators aim to categorize conceptions of a phenomenon of interest as accurately as possible and refrain from interjecting their preconceived ideas. A phenomenon can be understood qualitatively in terms of its referential and structural aspects [16]. Referential aspects are the attributes of the phenomenon conceived as a whole. Structural aspects are the parts of the whole and describe how the parts are related. The phenomenon of interest in our study was the lived experience of scientific writing in English by nonnative English-speaking doctoral supervisors and students.

In phenomenography, investigators allow the data to emerge so that rich description of a phenomenon is accurately captured. The interview/discussion questions are designed to elicit the participants' experiences, feelings, beliefs, and convictions about a phenomenon. The research questions and discussion questions are often distinct.

2.2. Setting and Participants and Their Recruitment.

The setting was a school of health, care and social welfare at a medium-sized university in Sweden. To obtain a purposive sample, the study was publicized a week beforehand. In the publicity notice and through word-of-mouth, doctoral supervisors and students were invited to participate in separate focus groups. In the study announcement, potential participants were informed that the focus groups would last 75 minutes. They were also invited to attend an interactive seminar on English scientific writing given by an investigator. This seminar followed each focus group. Participants were not obliged to attend a focus group to attend the seminar.

This opportunity was particularly important for the graduate students to avoid the perception of coercion to participate. The focus groups and the seminar were conducted in English.

2.3. Data Gathering.

Data gathering methods included audiotaping and memoing or field notes. Audiotaping of the focus groups was conducted with two electronic devices to minimize the risk of inaudible or lost data. Two investigators had access to the audiotapes, hence knowledge of participants' identities prior to coding.

The same experienced investigator served as the focus groups' leader. First, she described the aim of the focus group and reinforced that individuals had provided consent to participate by attending and that their responses would be masked.

The focus groups had the same structure. They began with a warm-up question about the meaning of scientific writing. Then, the discussion focused on five topics related to English scientific writing, that is, benefits, challenges, facilitators, barriers, and, finally, support needs to improve writing proficiency. At the end, participants completed a questionnaire about their language proficiencies, experiences in scientific writing and publishing, and support needs, if any, for improving their writing. The two focus groups were two days apart.

Memoing consists of the investigators' recording notes about what they hear, see, experience, and think over the course of collecting and reflecting on the process. These observations and reflections are used in the explication of the findings. The three investigators were present for both focus groups and took notes.

2.4. Explication of the Findings.

In phenomenography, data are explicated rather than analyzed. The five steps include bracketing; delineating meaning units or referential aspects; clustering structural units and defining a focus for each referential aspect; summarizing each interview/discussion and validating it and, where necessary, modifying it (results); and extracting general and unique themes (discussion).

Bracketing refers to containing the investigators' views and preconceptions so they do not influence the interview/discussion processor explication of the findings.

Delineating meaning units and foci refers to extracting statements that illuminate the researched phenomenon. Although investigators are required to make judgments while consciously bracketing their own presuppositions, they avoid extraneous judgments about the data and their explication. Two investigators listened repeatedly to the audio recordings to familiarize themselves with the participants' words and develop a holistic sense. The recordings were transcribed and read and reread multiple times to similarly develop a holistic sense. Significant statements related to the study aim were marked. The referential aspects of the phenomenon of scientific writing in English were identified according to similarities and differences for the two groups. Then, the focus of each referential aspect of the phenomenon was identified and its structural aspects, that is, what each group's participants primarily focused on. To strengthen the study's credibility, the investigators discussed the referential and

Table 1: Background of doctoral supervisors ($n = 5$) and students ($n = 13$) with respect to primary language, publishing experiences, and related perceived educational needs (frequency).

(a)

Doctoral supervisors ($n = 5$)	
Attribute/descriptor	Frequency
Primary language Swedish	4
English as a second or third language	5
Publishing experience (y)	4 to 15 (out of 4 responses)
Peer-reviewed publications	7–65
Formal scientific writing instruction/course	None (4) 20 wk course, 10 h/wk (1)

(b)

Doctoral students ($n = 13$)	
Attribute/descriptor	Frequency
Primary language Swedish	10
English as a second or third language	13
Publishing experience (y)	No experience (8) 0.5 to 4 (5)
Peer-reviewed publications	None (9) 1 or 2 (4)
Formal scientific writing instruction/course	None (8) 2 wk course (4) One day in research education (1)

structural aspects as they evolved and their interpretations until agreement was reached.

3. Results

3.1. Participants. Participants included a purposive sample of 5 doctoral supervisors and 13 students. The details of their publication experiences and instruction in scientific writing appear in Table 1.

3.2. Focus Groups. In the transcripts of the supervisor group, the two investigators identified 80 to 85 significant statements in a total of 5700 to 5800 words. In the transcripts of the doctoral students, the two investigators identified 120 to 125 significant statements in a total of 4100 to 4200 words.

3.3. Doctoral Supervisors' Conceptions. The analysis revealed four qualitatively distinct referential aspects that describe the doctoral supervisors' conceptions of scientific writing in English: a challenging task, an academic responsibility, a "disadvantageous" struggle, and need to master the written English language (Table 2). Scientific writing was described as being concise, structured, and clear; writing that reflects a topic's essence. Supervisors acknowledged that writing traditions for quantitative and qualitative research are distinct. They also acknowledged journal differences in style and formatting.

First, with respect to scientific writing in English being challenging, the focus that emerged was the writing process. Supervisors described the demands of writing including language demands and time constraints. Language demands included the fact that direct translation to English is limited as it fails to capture the essence of the intended meaning. Supervisors concurred that ways of thinking, knowing, and conceptualizing ideas and framing arguments are distinct across languages. They acknowledged that writing in English is "hard" work and more time-consuming than in their native languages. A shared experience was the conflict between teaching and administrative responsibilities and research and writing time.

Second, supervisors acknowledged that writing in English is an academic responsibility. English being the universal language of science necessitates supervisors having a high level of proficiency in order to have their work accepted for publication. It was viewed as an "unspoken expectation."

Third, the conception that English scientific writing is a "disadvantageous" struggle was a sentiment shared by supervisors. Publishing in their native languages was not viewed as an option given journals in their fields often do not exist and, if they do, their scientific quality, circulation, and distribution are limited. Examples of the "disadvantageous" struggle included experiences of having reviewers' ridicule their writing. Also, they reported being required to overly justify their contexts compared with mainstream native English-speaking peers. They attributed these experiences to editors and reviewers having little awareness of and sensitivity to the challenges of nonnative English-speaking contributors in writing in English for publication. Supervisors expressed hesitancy to share English language challenges with their colleagues.

Lastly, the need for supervisors to master written English focused on the need to facilitate a culture of English communication in their settings. Despite having written in English for many years, supervisors still struggle with English grammar, composition, and punctuation. More salient was the struggle to find appropriate English words to translate ideas into English that have been conceptualized in their own languages. They concurred that a facilitating English-immersion environment would improve proficiency in their written English, for example, more teaching opportunities in English, seminars in English, and having native-speaking English language support people within their departments and familiar with their content. Supervisors' favored resources and supports for improving English proficiency appear in Table 3.

3.4. Doctoral Students' Conceptions. Four referential aspects emerged for the doctoral students: a struggle to master scientific writing in English, need to focus on the goal, need for writing guidance and assistance, and a challenging on-going learning process (Table 4). Scientific writing was described as a means of communication in the scientific community. It was associated with the structured IMRAD format. Students viewed scientific writing as a process informed by objective evidence and ethical considerations.

First, with respect to the struggle of mastering English scientific writing, concerns included the time needed to write in English, no direct translation, and limited opportunities to

Table 2: Nonnative English-speaking doctoral supervisors' phenomenographic (referential and structural) aspects related to the experience of scientific writing in English based on a semistructured focus group discussion.

Referential aspects	Structural aspects
	Focus: the writing process
	Aspects derived are as follows:
	(i) Easier in Swedish but necessary in English
	(ii) English being the scientific default scientific language; common language of communication
	(iii) Various ways of thinking, saying, knowing, and doing cross cultures that is reflected in language and writing
	(iv) To produce a concise and clear text being an arduous but creative process that takes time
	(v) Each language and countries with the same language making assumptions, for example, use of abbreviations (NHS in UK based literature)
	(vi) Drafts often in "Swenglish" (combined Swedish and English)
	(vii) Writing in English being tiring and hard; native English speakers not understanding how difficult it is for non-English speakers
A challenging task	(viii) The process can also be rewarding, evoking feelings of pride, enjoyment, and achievement
	(ix) Need for prolonged periods of dedicated writing time (English immersion)
	(x) The process being hindered by fragmented time
	(xi) Research and writing time competing with teaching and administrative responsibilities; the latter are tangible and more readily schedulable, whereas research and writing time is amorphous and absorbed
	(xii) Need for administration support to protect research and writing time comparable to classes and meetings, for example, organize teaching schedules where possible to maximize blocks of time for research and writing
	(xiii) Supervisors perceiving that they have little voice in scheduling
	(xiv) Supervisors themselves could do more to schedule protected research and writing time rather than relegating writing in particular to evenings and weekends
	(xv) Creative (esthetic) process and rewarding in the end; disseminating one's work; potential for networking and contacts in the field
	(xvi) Intrinsically gratifying to have actually succeeded in achieving a publication when writing in non-one's native language
	Focus: scientific writing in English is a necessity
	Aspects derived are as follows:
	(i) "Publish or perish" scientific culture
	(ii) English being the language of science
An academic responsibility	(iii) An academic necessity for establishing international contacts as well as presenting research results
	(iv) Having proficiency in scientific writing in English being an unspoken expectation of being international researchers
	(v) Making a difference requiring disseminating work in English
	(vi) Research and writing being academic expectations, yet they receive less priority in terms of time allocation which is mostly allocated for teaching and service responsibilities (committee work)
	(vii) Research and writing need to be better integrated into the institutional reward structure

TABLE 2: Continued.

Referential aspects	Structural aspects
	Focus: disadvantages of being a nonnative English speaker
	Aspects derived are as follows:
	(i) Swedish journals being few; even if they exist in field, they do not have a far reach, are less likely to be indexed, and do not have the impact factors of English journals
	(ii) The Swedish language is particularly limited in the scientific community, even more limited than languages such as French and German that have traditionally broader scientific reach
A "disadvantageous" struggle	(iii) Being ridiculed by reviewers
	(iv) Having to overly explain circumstances and conditions
	(v) Being less familiar with other writing traditions, cultures, or systems
	(vi) Challenges of being able to achieve nuanced English, meanings, concepts, structure, and flow of writing the manuscript text
	(vii) Even professional proofreaders are often unfamiliar with scientific concepts
	(viii) Services of proof reading company commissioned by universities can be poor (too instrumental approach to translation)
	(ix) Hesitant to share English language limitations with colleagues; English proficiency is assumed to be a "given"
	(x) Writing in English is something that has to be done; do not question it
	(xi) Nonnative English speakers (reviewers) do not appreciate how difficult it is for a nonnative English speaker to write in English
	Focus: facilitating a culture of English communication in academia
	Aspects derived are as follows:
	(i) Language challenges including grammar, punctuation (hyphenation and comma usage; few words in English compared with Swedish; nuances; nuances in English challenging; word choice; sentence structure; structuring an argument; UK versus US spelling; and conceptualization being distinct
	(ii) Learning by doing, seminars in English, guest native English-speaking teachers, peer support, connections between teaching and writing, handbooks, proofreaders, being in international environments/setting/research programs
	(iii) Creating on-going English-speaking environment within departments with series of native English-speaking guest researchers so English becomes more spontaneous and less conscious effort
	(iv) Requiring teaching in English (teaching in English makes it easier to write and communicate in English)
Need to master the written English language	(v) Having a climate that allows for errors
	(vi) Limitation of resources for professional proofreaders
	(vii) Professional proofreaders can be limited; need to develop a partnership with them; stay with the same person
	(viii) Need for native English-speaking proofreaders in supervisors' fields who can nurture a relationship and understands the field; stay with that person
	(ix) Need for experiences abroad in English-speaking academic cultures (study leaves; visits) particularly early in graduate education and career
	(x) Stimulating an English-speaking (spoken and written) culture by structuring regular (daily or weekly) English-speaking seminars, research meetings, journal clubs, and scientific writing groups including the challenges of writing as well as issues related to technical scientific writing in English; preference for 1 : 1 feedback and small group; courses may have benefit; writing seminars (content and style); see various styles among native English speakers
	(xi) International collaborations are increasingly encouraged; making use of these for structured focus on English discourse and interaction (spoken and written)
	(xii) English improving with increased exposure, even limited exposure, for example, a conference in an English-speaking country
	(xiii) Need for opportunities for "quality" of feedback (rather than nonconstructive feedback, ridicule, and sarcasm)
	(xiv) Dilemma that even when writing is proofed by a native English-speaking colleague, the reviewers still comment on the quality of the language

TABLE 3: Desired supports and resources to maximize English scientific writing proficiency articulated by nonnative English-speaking doctoral supervisors and students.

Doctoral supervisors	(i) Recognition of administration and department heads of research and writing as priorities needing dedicated time (ii) Need to cluster teaching as much as possible to allow blocks of time for research and writing (iii) Creating an English communication culture (experiences abroad and visiting native English-speaking visiting guest professors to departments) (iv) Hands-on working groups (v) More opportunities to speak and teach in English (vi) Access to a departmental native English-speaking resource person (vii) Access to proofreaders but who are knowledgeable about the content and language of the discipline (viii) Importance of a sustained relationship with a proofreader (ix) Translator services but need personnel to be familiar with discipline and context (x) Constructive criticism and correction versus destructive, negative, and insulting comments (xi) Need for more handbooks and hands-on resources targeting the needs of nonnative English-speaking scholars (xii) More opportunities to share writing issues with colleagues in field
Doctoral students	(i) Even brief times in English-speaking contexts (immersion) need to be encouraged, but exposure to English needs to be sustained (ii) Ready access to a native English speaker with knowledge of the student's field (iii) Devoting time to identify and read exemplary articles in English for style (not only content) (iv) More opportunities to present in English (v) An atmosphere where it is acceptable to make mistakes to foster constructive feedback and minimize fear of destructive criticism (vi) Discussion of writing strategies as well as English grammar and composition (vii) Personalized concrete feedback so students learn how to edit their work by understanding what is wrong and why (viii) Need for more handbooks and hands-on resources targeting the needs of nonnative English-speaking scholars (ix) More opportunities to share writing issues with peers in field

practice English. However, they acknowledged that moving between languages afforded them new perspectives and ideas. Further, they described the limitations of tools such as Google translator even though many used it. Despite limited publication experience, students expressed concern that reviewers would criticize their English.

Second, students focused on the short-term goal of publication. They viewed publication as a means of disseminating work and networking internationally. They expressed mixed feelings about proofreaders. They described their limitations, for example, lack of in-depth content knowledge. Also, they expressed hesitation to override a proofreader's suggestion believing the proofreader is more knowledgeable.

Third, regarding writing guidance and assistance, the students articulated that they needed supportive strategies to maximize their writing and publication success. Supports they favored were seminars and teaching in English; being required to speak English; individual feedback; and guidance in developing writing strategies. Although students were aware of self-help writing guides, they mostly used representative published articles as examples of proficient English scientific writing.

Lastly, students experienced scientific writing as an ongoing learning process. They were concerned about developing their personal writing styles and overcoming barriers such as inexperience and lack of confidence. To improve their English writing, they discussed the importance of reading more articles to learn from their styles as well as contents. English immersion opportunities were considered essential. They were however reluctant to share their writing challenges with peers. Students' favored resources and supports for improving English proficiency appear in Table 3.

4. Discussion and Conclusion

In terms of final explication of the findings, this discussion focuses on similarities and differences between the doctoral supervisors and students regarding their experiences of English scientific writing that emerged in the referential aspects and their foci and structural aspects. Secondarily, we identify similarities and differences identified by the two groups regarding writing supports.

4.1. Group Findings. Quotations are identified as supervisor (SUP) or student (STUD), by participant number (P-*x*) and transcript page number (*x*). To further mask participant identity, there is no reference to each participant's sex. Some words and phrases have been selectively added in the participants' quotations, shown in parentheses, to maximize their clarity or further ensure participant anonymity.

Regarding similarities, doctoral supervisors and students referred to the writing process in English as hard work and time-consuming (supervisor referential aspects, a challenging task, and need to master written English language), student referential aspects, a struggle to master English scientific writing, and a challenging on-going learning process. Supervisors' primary concern was insufficient time. Supervisor 1, for example, said "...No, not just (having) time, but (having) coherent time" (Sup-P1, page 11). Students were largely concerned about the process. For example, Student 12 stressed that "...it's practicing of your English, as well as trying to look at it from different perspectives" (Stud-P12, page 3). Brevity and flow were another challenge. Student 2 said "I have to cut it, to take away part that you cannot explain in English, so you just explain the other part" (Stud-P2, page 6). And, Student 9

TABLE 4: Nonnative English-speaking doctoral students' phenomenographic (referential and structural) aspects related to the experience of scientific writing in English based on a semistructured focus group discussion.

Referential aspects	Structural aspects
A struggle to master scientific writing in English	Focus: the writing process Aspects derived are as follows: (i) Differences between native language and English with respect to syntactical structure (ii) Taking twice as long to write in English as in native language (iii) Need for writing strategies (iv) Need for more opportunities to practice and improve English (v) Various perspectives of difference journal styles and formats adding to the challenges; considering journal fit (vi) English being a struggle but there is enjoyment of learning more through the writing experience (vii) Moving between two languages enhancing understanding of one's area (viii) Struggling with argument development; finding appropriate words (ix) English being a more specific language than Swedish (use of a few words versus several in Swedish) (x) Challenges of no direct translation (xi) Challenges of writing quantitative research findings versus qualitative research findings; learning the differences; need for richness of language particularly for writing qualitative research results (xii) Danger of skipping something important because of lack of words to describe it ("feels like killing your darling") (xiii) Can be so preoccupied with structure that it interferes with writing what one wants and needs to say; then one loses momentum and motivation (leads to frustration) (xiv) Google translator having uses but also failing to capture nuances (xv) Even when supervisor agrees that manuscript can be submitted, students may believe it is not ready to go as students have too high expectations of themselves; concerned what the reviewers will say, and fear that they will put the student "down"
Need to focus on the goal	Focus: completion of the final product (the article) Aspects derived are as follows: (i) Working locally but thinking globally (ii) Focusing on the work's being read and used by researchers internationally (bidirectional) (iii) Articles in English having greater reach (iv) Awareness of the scientific structure (v) Need to establish contacts with other researchers (vi) Effective sharing may lead to fruitful collaborations and networking (vii) Need to address practical considerations such as varying journal styles and formats; reformatting being time consuming, taking away time from scientific writing (journals and authors would benefit from same styles and formats) (viii) Fearful to edit what a proofreader has suggested, lack of student's confidence to edit a proofreader for fear of article rejection (ix) Lack of resources to use a proofreader (x) Some potential value of professional proofreading companies; best if proofreaders is a native English speaker and familiar with the content area and its vocabulary

TABLE 4: Continued.

Referential aspects	Structural aspects
	Focus: supportive strategies to maximize publishing success
	Aspects derived are as follows:
	(i) Formal instruction in the form of courses and workshops would be beneficial in writing compelling arguments and expressing ideas concisely (beyond journals' guidelines and instructions for authors)
	(ii) Favoring receiving help from supervisors who have considerable publishing experience and peer support mostly in the form of "time" to give constructive feedback and explanations for edits so that the graduate student can learn to effectively self-edit (built in expectations within the supervisor-student relationship)
	(iii) Feedback being needed at the global level in terms of argument construction and tightness of the work, as well as the microlevel of grammar, composition, and style
Need for writing guidance and assistance	(iv) Ph.D. seminars can be helpful in articulating logical ideas in English and defending positions
	(v) The iterative process of improving English written communication feels "like a bird trying to fly"
	(vi) Need for a logical strategy or systematic process for clear writing and achieving flow, for example, think and write in Swedish and translate into English; think and write in English from the start; and write in a combination of languages just to get something down and keep moving
	(vii) Uncertainty about "flow" and how to achieve "flow"; this is challenging when being on the forefront of new knowledge
	(viii) For some, starting in English leads to a simplistic result; unable to follow up with sentences of deeper meaning
	(ix) Representative published articles in prestigious journals were viewed as excellent source of learning how to frame arguments and express ideas
	(x) Self-help guides to scientific writing can be helpful, for example, Creslow; some advice includes "just start writing" but feedback is necessary, for example, "why this and not that," so students avoid making the same mistakes in the future
	Focus: the learning process
	Aspects derived are as follows:
	(i) To make written English feel like their own; need skills to overcome barriers such as insecurity and inexperience
	(ii) Various languages having distinct writing traditions (arrive at the important point at the end of the sentence or paragraph, rather than the important point being upfront)
A challenging on-going learning process	(iii) Suggestion of sex differences in writing, specifically that men may be more to the point versus women's speech characteristics are more nuanced
	(iv) Language determining word sequencing; need to relearn this for English
	(v) Continuing to read extensively in English; reading informing writing
	(vi) Frequent opportunities for English immersion (e.g., several-day trip by one participant to an English-speaking country, even on the plane already thinking and writing more clearly in English; this window and receptiveness to English language persisted throughout the trip); constant exposure to English and English speakers improving the participants English even over a short timeframe; on return to Sweden the "window closed"
	(vii) Need for ongoing seminars in English or teaching opportunities in English so students are always having to use the language and maintain fluency
	(viii) Before attending an English lecture or seminar, it can help to "warm up" by listening to English just beforehand (the English warm-up)

acknowledged that to "...write one sentence and to deepen that thought in the next sentence...that's the challenge..." (Stud-P9, page 8). Student 12 alluded to the experience as "wearing down one's motivation, the momentum gets lost, muted and that creates frustration" (Stud-P12, page 9).

Regarding journal styles, Student 11 stated that "when I look at the guidelines in certain journals, they are not so good...they are sort of vague and you have to read a couple of articles or a lot articles from that journal..." (Stud-P11, page 9).

Student 1 talked about the expectation of negative reviews related to the English "And may be you are a little bit afraid what the reviewers say about the text, may be they are hard...they have to say what is wrong of course, but in a way you are very much taken down" (Stud-P1, page 13).

Supervisors perceive writing as an academic responsibility (supervisor referential aspect, an academic responsibility), whereas students view the need to write in the short term (student referential aspect, a need to focus on the goal [an article]). Supervisor 2, for example, said that at a previous university there were financial rewards "...relating to the number of publications and the impact factor of (the journals) of those publications" (Sup-P2, page 5). Regarding writing as a short-term goal, Student 5 stated that "finishing and completing (a manuscript) is my goal" (Stud-P5, page 4). Student 7 also made reference to the goal of reaching "...a wider audience or target group...if it was published in Swedish, not so many people could read about it..." (Stud-P7, page 4).

Regarding writing English being a "disadvantageous" struggle, Supervisor 5 wished that "the English-speaking world better understood that they speak and write in their native tongue...it's very much a hegemoneous (hegemonical) English world (academia), and I...wish some more humbleness from the side of the journal..." (Sup-P5, page 15). He/she further acknowledged "how to you go about it (addressing the issue), but it is a barrier if you feel ridiculed because you write something and you make mistakes" (Sup-P5, page 16). Supervisor 2 added that "after a while if you survive this your skin gets harder" (Sup-P2, page 16), however Supervisor 5 expressed concern about the risk that "you become a perpetrator yourself" (Sup-P5, page 16).

The use of punishing tactics by reviewers, for example, ridicule/sarcasm and "making fun of your shortcomings," was viewed as counterproductive (Sup-P2 and Sup-P5, page 15). Supervisor 1 added that "I once had it (manuscript) come back a couple of times that I needed to, to get a better flow in the introduction...there was flow...I never understood the...criticism" (Sup-P1, page 16).

Supervisor 5 raised the issue of "beyond language but not less connected to writing in English is also the cultural lens" and "how you present an argument, what is flow, what is directness..." (Sup-P5, page 17). Regarding an academic cultural lens, he/she acknowledged that this can manifest in referencing, that is, "...cite too many Russian sources you would be rejected; you need 'proper' sources from the western world, those sorts of things are very hard to pinpoint..." (Sup-P5, page 17). Supervisor 2 also added that "...when we publish internationally we always have to...describe the Swedish healthcare system...when...I am the reviewer for US manuscripts they take it for granted that we understand their system..." (Sup-P2, page 18).

Improving proficiency in English scientific writing was identified as essential by both groups (supervisor referential aspect, need to master the written English language; and student referential aspect, need for guidance and assistance); however, the means of achieving this were distinct. Supervisors discussed the importance of facilitating a culture of English communication in academia. Supervisor 1 suggested that not only "using the time we have better" but also "better awareness in the organization of this need..." (Sup-P1, page 19). Overall, supervisors favored "hands on" feedback and small writing groups with a native English speaker to go over writing examples and sharing edited versions with each other. Supervisor 1 said "...not so much about content but how you formulate it, so you would sit together may be with different disciplines; it would be fascinating with an (native) English speaker, a scientist, discussing what I want to express, so you just take pieces of it and you discuss it, and you read each other's" (Sup-P1, page 19). Supervisor 2 suggested that in departmental seminars "...you sit together around a table and you work intensely with both content and structure and so on..." (Sup-P2, page 20). Supervisor 1 added that "once in a while we have a guest lecturer here and it is a researcher; it would be really nice to sit down for a short meeting and discuss...how should I express this with different examples" (Sup-P1, page 21). Supervisor 3 emphasized that even informal opportunities to communicate are worthwhile, specifically, "to start to talk...if you get to use the language in the corridors, in the 'fika' (coffee) room, I think that is important" (Sup-P3, page 22). Supervisor 5 noted "...why do not people want to teach in English?...if you teach in English it is easy to write in English, if you write in English it is more likely you can teach in English" (Sup-P5, page 22). Supervisor 1 added that "resistance about teaching in English...is not only from colleagues but actually...the students" (Sup-P1, page 23). Supervisor 5 added that "...when I started teaching...I taught only in English and that's how I started writing in English...you just learned by doing..." (Sup-P5, page 23).

Supervisors and students use various supports including handbooks. Supervisor 4 acknowledge that one handbook was particularly helpful as it describes "...how to think about language, not grammar in itself...ways to structure a text...words to start an argument...reach between two different ideas" and that it gives advice in a "friendly tone" (Sup-P4, pages 23 and 24). Student 9 referred to a particular resource: "...our favorite, he (author) wrote (recommended) to write every day...just to start writing...play with the words then come to the more scientific writing..." (Stud-P9, page 11).

The students focused on additional strategies. Student 6 acknowledged that "I read other articles...to find out...how they are using argumentation...expressing things..." (Stud-P6, page 10). Regarding scientific writing courses, Student 2 said that such a course "was quite helpful for you to figure out what is exactly scientific writing, what is the style; to move to introduction you have three 'moves', and then there is the issue of grammar...but you have to learn about the style and the flow...so you can construct your paper...scientifically" (Stud-P2, page 10).

Students agreed with Student 12 who emphasized the role of "a good supervisor and good friends that love to read English scientific text" (Stud-P12, page 10) as an important means of receiving concrete feedback and improving a manuscript. Student 7 acknowledged the importance of specific feedback: "...the details of writing, not only (that) this is wrong...I need to know why it is wrong...what I should write instead." Student 7 described a shared concern about avoiding similar mistakes in the future: "I have to improve my English...not (necessarily) for specific text but next time when I write something similar...I do not do the same mistake..." (Stud-P7, page 11).

4.2. Synthesis. Nonnative English-speaking doctoral supervisors and students in Sweden have unique lived experiences with scientific writing, with similarities and distinctions. Thus, they may benefit from specifically tailored writing supports vis-à-vis maximizing the rewards of the writing experience, reducing challenges, increasing facilitators, and reducing barriers [17, 18]. Supervisors urged editors and reviewers to provide more constructive rather than destructive feedback about language and expression. Opportunity to communicate in English was described as a means of keeping English language use current rather than restricting use of English to manuscript writing. Instructional objectives, formats, and feedback mechanisms in courses on scientific writing in English are indicated that extend beyond the standard journal advice and instructions for authors.

Although replication/extension studies are needed, steps need to be taken to ensure that the work of nonnative English-speaking scholars and trainees is effectively and fairly critiqued and evaluated by native English-speaking reviewers [19]. Standards must be preserved; however, reviewers need to be educated about the challenges of nonnative English speakers so their efforts can be maximally supported, to ensure their voices and perspectives are proportionately reflected in the literature [11]. Given that scientific writing in English is laborious for nonnative English speakers and precludes their publishing at rates comparable to their native English-speaking peers, such efforts could enable nonnative English-speaking scholars and trainees to maximize their scholarly productivity and contribution to the generation of new knowledge and science overall. Publishing an article in the language of an author's choice is not likely to be an option. However, reprinting articles in two or more languages is conceivable and desirable. Education needs to be provided for reviewers and editors to increase their awareness of the challenges of nonnative English contributors and maximize ways of supporting their efforts to publish. For example, this could include guidelines for providing constructive feedback that maximizes the contribution of the content and focus of a manuscript by improving the quality of English expression. Enabling the efforts of reviewers and editors in this way may curb the growth industries of ghost writing and predatory journals and potential for duplicate publication and plagiarism [20–22].

4.3. Conclusion. The efforts of nonnative English-speaking scholars and trainees could be more effectively supported in the peer-review process in academia, a process that is dominated by native English-speaking editors and reviewers. Targeted resources are needed for these contributors, and for editors and reviewers regarding their providing constructive and enabling feedback. Such supports would not only facilitate publication being a more rewarding and constructive experience for both parties, but also help limit systematic bias in the review process. In turn, this would help ensure that the voices of nonnative English-speaking contributors are more proportionally reflected in the scientific literature.
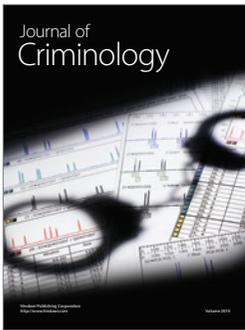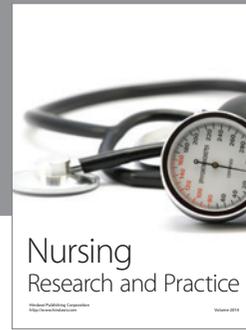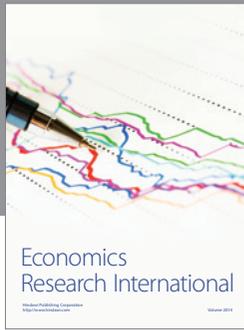
Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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