



Research article

Exploring the interplay of English academic reading and writing proficiency among international doctoral students

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ABSTRACT

Academic English is discipline-specific and requires a high level of linguistic knowledge as well as expertise in respective fields. Therefore, doctoral students with limited exposure to academic English tend to face challenges in dealing with its demands, especially when they come from non-native English-speaking (NNES) backgrounds. At the doctoral level, research students are expected to work independently. Therefore, the ability to critically engage with academic materials written in English and the ability to write a dissertation in English at an expected standard play essential roles in successful PhD completion for students studying in international PhD programs where everything is conducted in English. This study investigates the relationship between English academic reading (EAR) and English academic writing (EAW) abilities among NNES doctoral students. We conducted a survey by employing a 1–6 Likert scale, following Dörnyei and Dewaele (2022), in the 2021–2022 academic year. A total of 255 international doctoral students studying in 65 PhD programs across Hungary voluntarily participated in the study. The students came from 49 countries and represented 48 mother tongues. The analysis revealed that students were positive about their abilities in both EAR and EAW, even though there was a significant gender difference at the $p < 0.01$ level. Additionally, students with the highest English proficiency level (C2) were found to be the most confident about their EAR and EAW abilities. The most junior students from 1st-year PhD programs were less confident about their abilities compared to their peers from 2nd, 3rd, 4th-year PhD programs. The analysis showed a significantly positive correlation between EAR and EAW ($r = 0.792$, $p < 0.001$). This study highlighted the inseparable role of EAR in fulfilling doctoral requirements and submitting a dissertation within a contracted PhD time framework, indicating the importance of targeted language support in facilitating academic progression within PhD programs.

1. Introduction

PhD research students are expected to autonomously and efficiently handle all their doctoral tasks [1,2]. Consequently, consulting academic sources becomes a pivotal factor in their educational journey [3–5]. Since the majority of academic resources are available in English, proficient English academic reading (EAR) is a vital skill for PhD students. Mastering EAR not only enables students to comprehend and synthesize existing knowledge but also fosters critical thinking, effective communication, and disciplinary insights

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[6,7]; these skills are essential for success in the demanding landscape of doctoral research. Moreover, consulting key disciplinary academic sources ensures that their doctoral endeavors are research-based and valid [6]. For non-native English-speaking (NNES) doctoral students studying in international English-medium PhD programs, which requires them to submit their dissertation in English to their doctoral institutions within a contracted time framework, dealing with the demands of both EAR and EAW tend to be challenging, especially if they have limited academic experience in English [8–11].

Even though reading is often viewed as a receptive skill, consulting with academic materials at the doctoral level requires a high level of critical engagement. Therefore, even after investing long hours in reading academic texts, students may still encounter difficulties and feel intellectually stuck when grappling with the vast array of academic sources [4,12]. Many studies explored the academic journey of PhD students [3,8,9,13–17]. However, few studies have investigated the EAR abilities of international NNES doctoral students, who are studying in a context where English is used as a lingua franca for both faculty and students. Therefore, this current study aims to address this gap by investigating EAR experiences of NNES international doctoral students (N = 255) from 49 different countries, who spoke 48 different mother tongues, as well as the relationship between their EAR and EAW abilities. Additionally, as no similar study has been conducted in the PhD education context of Hungary, our study is innovative in this regard. Besides, the current study is part of an ongoing larger research project; in prior qualitative phases of the project in which the same international doctoral students participated, the students reported that they relied on reading to enhance their academic writing ability (Authors, 2024) while dealing with the demanding nature of EAW at the doctoral level (Authors, 2023, 2024). This current quantitative study also tries to complement findings of the qualitative phases (Authors, 2023, 2024).

2. An overview of the theoretical background

This section provides an overview of the theoretical background, focusing on academic English, English academic reading (EAR) in doctoral education, English academic writing (EAW) in doctoral education, and how EAR enhances EAW.

Academic English refers to “an approach to language education based on identifying the specific language features, discourse practices, and communicative skills of target academic groups, and which recognizes the subject-matter needs and expertise of learners” [18, pp. 383–384]. Therefore, proficiency in the target language is not enough to deal with academic English; it requires a set of skills and practices for successful engagement within academic contexts [19,20]. The complex and demanding nature of academic English becomes apparent, especially in meeting discipline-specific requirements, making it a challenging skill even for native English-speaking students [18]. Therefore, NNES students may face an additional hurdle due to the language barrier, which can significantly hinder their progress in completing a PhD [12].

English academic reading (EAR) is not merely the act of deciphering text; it involves a complex process of comprehension, analysis, and synthesis of information from scholarly sources [5,21,22]. Efficiently engaging with academic materials is consistently recognized as a crucial factor in developing students’ expertise in their specialization [8,23–27].

. Thesis advisors understand the critical role of EAR in educating doctoral students to become independent scholars [28,29]. Recent research by Achagwa et al. revealed that a lack of proper academic reading practice is one of the underlying causes of academic failure in pursuing a PhD education [30]. For NNES students, the process of interpreting complex academic texts can be particularly challenging due to the lexical and linguistic demands involved, often leading to the academic experience being described as a painful process [4].

In English-medium doctoral programs, English academic writing (EAW) must adhere to academically acceptable standards for all types of academic texts, such as research reports, conference papers, academic manuscripts, and dissertations. Doctoral dissertations are expected to make valuable contributions to the academic community, necessitating a high level of EAW competence to avoid ambiguity. NNES students’ EAW abilities are influenced by various factors, including lexical knowledge, grammar, syntax, critical engagement, paraphrasing, citation and referencing, logical presentation of ideas, summarization skills, and drawing conclusions [11, 15,31,32]. Writing scholarly texts at the doctoral level is discipline-oriented, making it challenging for students to get their papers published in indexed journals, irrespective of whether the target journal uses single or double-blind peer review [8,9,33,34]. Consequently, NNES students studying in international PhD programs conducted in English may face difficulties in meeting publication requirements and completing their dissertations within expected academic standards and time frames.

A doctoral dissertation requires a critical overview of all related academic sources, and each research step must be theory-driven, transparently presented, and evidence-based. The literature review, as a separate chapter in all PhD dissertations, serves as evidence that doctoral students have critically reviewed relevant academic sources. The essence of a PhD dissertation lies in its valuable and novel contribution to respective disciplines, making extensive reading of academic materials the first step in writing a scholarly text. As succinctly expressed by a Pakistani NNES PhD student in a study conducted by Batool et al., “The researcher needs to set priorities. If my priority is writing, I cannot write immediately. I have to read, think, and then write” [34, p. 38]

English academic reading (EAR) plays a crucial role in developing academic writing abilities at the doctoral level. Engaging with academic materials familiarizes students with the features of English academic writing in a standardized manner [35–37]. Moreover, the quality of doctoral-level academic texts is greatly influenced by the extent of students’ reading [3,12,35]. The significance of academic reading in doctoral writing is evident in previous studies. For instance, Badenhorst and Xu highlighted the initial step of reading in creating acceptable manuscripts [38], while Odena and Burgess emphasized the value of reading for NNES students to improve their writing [8]. Jomaa and Bidin revealed the positive impact of continuous reading on students’ writing improvement [27].

While reading is invaluable for doctoral students, choosing key sources in a specific discipline is not always straightforward [6]. Students must be critical enough to evaluate the validity of arguments in texts and determine how well a publication was researched [39–41]. Simply absorbing information from reading sources without critical assessment results in writing that lacks academic rigor

and quality. Critical thinking is essential for dealing with academic tasks and enables novice researchers to make well-informed decisions at every stage of their research [40,42,43].

Therefore, academic reading is crucial for developing the academic writing skills necessary for a successful doctoral journey. Engaging with academic texts exposes students to conventions, effective structures, and scholarly discourse, enhancing their ability to construct coherent narratives, utilize appropriate citations and references, and communicate their research effectively at the doctoral level [6,35]. Furthermore, reading facilitates the acquisition and internalization of grammatical structures, leading to improved accuracy in writing. Additionally, reading stimulates critical thinking skills, enabling students to analyze different perspectives, form evidence-based arguments, and enhance the quality and depth of their academic writing [5,44]. By actively engaging in reading, NNES students can significantly enhance their EAW abilities, resulting in more effective communication and academic success, as supported by the findings of the selected studies [3,7,45]. However, there were very few studies that explored how confident NNES doctoral students are with their EAR abilities and how their EAR abilities correlated with their EAW abilities, especially in the doctoral education context of Hungary.

3. Method

3.1. Research design

The current study is part of an ongoing larger project that investigates the experiences of NNES doctoral students in international PhD programs where English serves as a lingua franca for students and faculty. In order to achieve a comprehensive understanding of the research focus, we decided to employ a mixed-method design as it enhances the validity and reliability of findings, integrating qualitative insights into the context with quantitative statistical analysis [46–49]. Following the established research principles outlined by Refs. [46–49], an exploratory sequential mixed-methods design was used for our project. This design encompasses a dual-phase approach, beginning with an initial qualitative phase and progressing to a subsequent quantitative phase. The emphasis of this particular study falls within the quantitative phase.

3.2. Research questions

In prior phases of our ongoing larger project, which included the same international students, the findings revealed that the students were not well-equipped with abilities to write academic texts upon their PhD entry (Authors, 2023a), a sentiment also reflected in their personal metaphors conceptualizing their EAW experiences along the PhD journey (Authors, 2023b). In the qualitative study investigating how to improve their academic English abilities to fulfill doctoral requirements in their respective programs, reading was reported as one of the strategies they relied on for improving their academic abilities (Authors, 2024). Informed by prior phases, the current study aims to investigate their EAR abilities by formulating the following questions.

RQ1. How do NNES doctoral students in this study self-assess their EAR abilities?

- (i) What is the difference among three groups of English proficiency levels (C2, C1 and B2)?
- (ii) What is the difference between genders?
- (iii) What is the difference across four academic years (1st, 2nd, 3rd and 4th year of PhD studies)?

RQ2. How do the students self-assess their EAW abilities?

RQ3. What is the relationship between their EAR and EAW abilities?

3.3. Participants

A total of 255 international doctoral students from NNES backgrounds volunteered to participate in the study. These participants were distributed across 65 distinct international PhD programs in Hungary during the academic year 2021–2022. Originating from 49 diverse countries, they represented 48 different first languages. In terms of English proficiency, a small minority entered the programs equipped with a C2 level English proficiency certificate (8.6 %), while the majority held C1 (45.5 %) and B2 (45.9 %) certificates. Gender distribution showed that 125 respondents identified as female (49.01 %), 127 as male (49.80 %), and three participants (1.17 %) chose not to disclose their gender. Most respondents were in their initial or second year of their PhD programs: 36.5 % were in the first year, 25 % in the second year, while the remaining participants were distributed across the third year (18 %), fourth year (16.9 %), and unspecified years (1.6 %).

3.4. Instrument

In pursuit of the research objectives, the instrument covered two constructs: English academic reading (EAR) and English academic writing (EAW). These constructs were developed based on discussions among scholars presented in section 2. The created instrument underwent review by a panel consisting of two experts and one experienced researcher, and necessary changes in diction were made as recommended by the panel. The constructs were also assessed using Cronbach's alpha (α) values. An alpha value above 0.70 is

considered acceptable for research purposes, while values above 0.80 indicate a very high level of reliability and validity [50–52]. In this study, both constructs achieved alpha values above 0.8, demonstrating excellent internal consistency of the items in each construct: EAR (5 items, $\alpha = 0.820$), EAW (22 items, $\alpha = 0.979$). The survey items for both constructs were presented as self-assessment statements, utilizing a 6-point Likert Scale (ranging from 1 = strongly disagree to 6 = strongly agree), a design choice made to prevent neutral responses as advocated by Dörnyei and Dewaele [53].

3.5. Data collection procedure

As soon as we received ethical approval certificate issued by the Institutional Review Board (Reference number: 17/2021, see Appendix), we created a survey using Google Form. This link was used to invite participation from all NNES doctoral students. The survey explicitly stated the voluntary nature of participation and assured respondents that their data would be coded and exclusively utilized for research purposes. Contact information for the first author, including affiliation and email address, was transparently provided to enable participant communication. The survey link remained accessible from February 21st, 2022 to December 30th, 2022.

3.6. Data analysis

Firstly, to ensure the privacy of the participants in the study, they were anonymously coded following the research ethics guidelines of the American Psychological Association [54,55]. The collected data underwent comprehensive analysis, adopting the approach outlined by Ref. [56]. For addressing the first research question (RQ1), descriptive analysis was employed to assess students' self-assessment of their EAR abilities following Loeb et al. [57]. To investigate differences across three proficiency groups (C2, C1, and B2), as well as variations across the four academic years, a one-way ANOVA was conducted, following the guidelines proposed by Hair et al. [58]. Gender differences were examined using independent sample t-tests following the established principles [58]. To answer the second research question (RQ2), descriptive analysis was employed following Loeb et al. [57]. For the third research question (RQ3), Pearson correlation analysis was conducted following the approach outlined by Field [59].

4. Results of data analysis

4.1. RQ1. Students' self-assessment on their EAR abilities

In this study, participants were invited to evaluate their skills on a 1–6 Likert scale, with negative connotation options (strongly disagree, disagree, slightly disagree) and positive connotation options (slightly agree, agree, strongly agree). Table 1 displays the distribution of responses to each self-assessment statement. The majority of students exhibited optimism regarding their EAR abilities, with a substantial number choosing the positive options “slightly agree,” “agree,” and “strongly agree.” Even in cases where students opted for negative sentiments, “slightly disagree” was favored over “strongly disagree/disagree,” as evident in Table 1.

The mean scores for students' self-assessed EAR abilities ranged between 4.38 and 4.84, with standard deviations ranging from 0.96 to 1.32. As the assessment items were presented on a 1–6 Likert scale, the mean score between 4 and 5 revealed that the students “agree” with the given statements, indicating a high level of confidence for their abilities to read academic texts in English (Table 2). Notably, the lowest mean score was associated with comprehending technical words or phrases (EAR1), while the highest was attributed to understanding complex texts without a dictionary (EAR2). These findings underscored students' confidence in comprehending academic texts, even if unfamiliar technical terms were encountered. In terms of critical text analysis skills, there was less variation among the students, as evidenced by lower standard deviation values for these items.

4.1.1. Differences among English proficiency levels

Comparing self-assessment responses across different English proficiency levels, as shown in Table 3, reveals a consistent pattern. Students with higher English proficiency level (C2 and C1) generally avoided negative self-perception options (“strongly disagree” or

Table 1
Distribution of the students' EAR self-assessments.

EAR self-assessments	strongly disagree (%)	disagree (%)	slightly disagree (%)	slightly agree (%)	agree (%)	strongly agree (%)
I rarely have difficulty with comprehending technical words or phrases. (EAR1)	3.1	8.2	11.4	22	35.3	20
I can understand the details in long complex texts without using a dictionary. (EAR2)	0	5.1	5.9	18	42.4	28.6
I can understand journal articles without rereading difficult sections. (EAR3)	0.4	4.7	12.2	21.6	39.6	21.6
I can use my critical thinking to determine how well a publication is researched. (EAR4)	0.4	2.4	5.5	23.5	45.1	23.1
I can use my critical thinking to decide the validity of arguments in a text. (EAR5)	0	3.1	7.5	42	26.7	20.8

Table 2
Mean scores of students' self-assessed EAR.

Code	English academic reading (EAR)	M	SD
EAR1	I rarely have difficulty with comprehending technical words or phrases.	4.38	1.32
EAR2	I can understand the details in long complex texts without using a dictionary.	4.84	1.07
EAR3	I can understand journal articles without rereading difficult sections.	4.60	1.12
EAR4	I can use my critical thinking to determine how well a publication is researched.	4.80	0.96
EAR5	I can use my critical thinking to decide the validity of arguments in a text.	4.70	0.98

“disagree”). For instance, students in the C2 group seldom chose such options except for comprehending technical words or phrases, EAR1 (which indicated that even C2 groups might not be familiar with discipline-oriented terminology). On the other hand, those at the B2 level exhibited a higher inclination toward negative options. Particularly, critical thinking skills in the C2 group were highlighted by the absence of the “slightly agree” option and a notable preference for “strongly agree.” The distinctions among proficiency levels were visually presented in Fig. 1.

The differences among proficiency levels were statistically validated using one-way ANOVA tests. Subsequent post hoc tests revealed that C2-level students outperformed B2-level students significantly across all EAR self-assessments. Moreover, the C1 group scored significantly higher than the B2 group in three out of five items (EAR3, EAR4, EAR5). For EAR4, the C2-level group's scores were significantly higher than those of C1-level students (Table 4).

4.1.2. Gender differences in the students' EAR self-assessments

The analysis result for gender differences in EAR self-assessments are presented in Table 5. The analysis revealed that male students exhibited more positive self-perception of their EAR abilities compared to their female peers, except for the statement related to technical words or phrases (EAR1). It is also found that more male students chose “strongly disagree” on this item (EAR1), while more females opted for “strongly agree,” indicating male students' lower confidence in understanding technical terminology.

Fig. 2 visualizes these gender differences in EAR self-assessments, highlighting that while females showed higher self-assessed mean scores for comprehending technical words or phrases (EAR1), males scored higher on all other self-assessment items, particularly for understanding complex texts (EAR2, EAR3, EAR4, EAR5). Independent samples t-tests confirmed significant differences in self-assessment for three out of five items (EAR3, EAR4, EAR5) at the $p < 0.05$ level.

4.1.3. Differences among different years of PhD study

The analysis continued by investigating self-assessment differences across various years of PhD study. Table 6 presents these findings, revealing that 1st-year students exhibited the highest inclination toward negative options (“strongly disagree,” “disagree,” “slightly disagree”) across all self-assessment items. Interestingly, senior PhD students (2nd-, 3rd-, and 4th-year PhD students) demonstrated a trend of avoiding “strongly disagree” across four self-assessment items (EAR2, EAR3, EAR4, EAR5), with 1st-year students having the highest percentage of negative responses.

Fig. 3 visually captures these distinctions among different years of PhD studies. Students in the 1st-year PhD programs displayed the lowest self-assessed mean scores across all EAR self-assessment items. One-way ANOVA tests identified significant differences for EAR3 and EAR4 at the $p < 0.05$ level. Further post hoc tests, utilizing Tukey HSD, revealed that 4th-year PhD students scored significantly higher than 1st-year PhD students for EAR3. For EAR4, 3rd-year PhD students achieved significantly higher mean scores than 1st-year PhD students (Table 7).

Table 3
Distribution of the EAR self-assessments by English proficiency levels.

		strongly disagree (%)	disagree (%)	slightly disagree (%)	slightly agree (%)	agree (%)	strongly agree (%)
technical words or phrases (EAR1)	C2	0	9.1	4.5	4.5	27.3	54.5
	C1	4.3	6.9	8.6	19	38.8	22.4
	B2	2.6	19.4	15.4	28.2	33.3	11.1
the details in long complex texts without using a dictionary (EAR2)	C2	0	0	9.1	9.1	18.2	63.6
	C1	0	3.4	2.6	12.9	44.8	36.2
	B2	0	7.7	8.5	24.8	44.4	14.5
journal articles without rereading difficult sections (EAR3)	C2	0	0	9.1	9.1	36.4	45.5
	C1	0	3.4	9.5	18.1	46.6	22.4
	B2	0.9	6.8	15.4	27.3	33.3	16.2
critical thinking to determine how well a publication is researched (EAR4)	C2	0	0	0	0	50	50
	C1	0	0.9	6.9	20.7	44.8	26.7
	B2	0.9	4.3	5.1	30.8	44.4	14.5
critical thinking to decide the validity of arguments in a text (EAR5)	C2	0	0	4.5	13.6	36.4	45.5
	C1	0	0.9	7.8	21.6	44.8	25
	B2	0	6	7.7	34.2	40.2	12

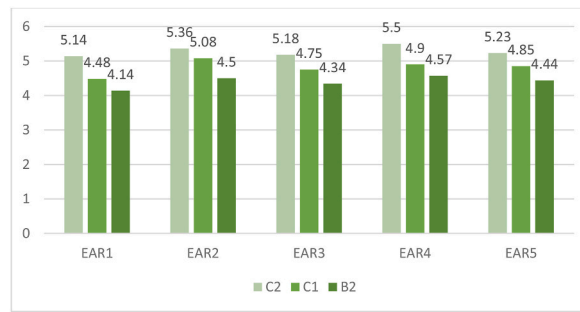


Fig. 1. Differences among C2, C1 and B2 group.

Table 4
Multiple comparisons among the C2, C1 and B2.

		(I) Proficiency	(J) Proficiency	Mean Difference (I-J)	Std. Error	p	95 % Confidence Interval	
							Lower Bound	Upper Bound
EAR1	I rarely have difficulty with comprehending technical words or phrases.	C2	B2	0.99961 ^a	0.30049	0.003	0.2912	1.7081
EAR2	I can understand the details in long complex texts without using a dictionary.	C2	B2	0.86791 ^a	0.23724	0.001	0.3086	1.4272
EAR3	I can understand journal articles without rereading difficult sections.	C2	B2	0.83994 ^a	0.25327	0.003	0.2428	1.4371
		C1	B2	0.40812 ^b	0.14281	0.013	0.0714	0.7448
EAR4	I can use my critical thinking to determine how well a publication is researched.	C2	C1	0.60345 ^b	0.21573	0.015	0.0948	1.1121
		C1	B2	0.92735 ^a	0.21559	0.000	0.4191	1.4356
EAR5	I can use my critical thinking to decide the validity of arguments in a text.	C1	B2	0.32390 ^b	0.12156	0.022	0.0373	0.6105
		C2	B2	0.78283 ^b	0.22165	0.001	0.2603	1.3054
		C1	B2	0.40900 ^a	0.12497	0.003	0.1144	0.7036

^a The mean difference is significant at the 0.05 level.

Table 5
Distribution of the EAR self-assessments by gender.

		strongly disagree (%)	disagree (%)	slightly disagree (%)	slightly agree (%)	agree (%)	strongly agree (%)
technical words or phrases (EAR1)	Female	1.6	8.8	15.2	20	30.4	24
	Male	4.7	7.9	7.9	23.6	39.4	16.5
the details in long complex texts without using a dictionary (EAR2)	Female	0	6.4	7.2	21.6	32.8	32
	Male	0	3.9	3.1	15	52	26
journal articles without rereading difficult sections (EAR3)	Female	0	7.2	15.2	24	32	21.6
	Male	0.8	1.6	9.4	18.9	47.2	22
critical thinking to determine how well a publication is researched (EAR4)	Female	0	3.2	9.6	25.6	39.2	22.4
	Male	0.8	1.6	1.6	20.5	51.2	24.4
critical thinking to decide the validity of arguments in a text (EAR5)	Female	0	3.2	10.4	35.2	29.6	21.6
	Male	0	3.1	3.9	17.3	55	20.7

4.2. RQ2. Students' self-assessments of their English academic writing abilities

Moving on to students' self-assessment of their English academic writing (EAW) abilities, Table 8 presents the mean scores for each self-assessment statement. The results indicate a positive outlook among students, with mean scores ranging between 4.25 and 5.02, and standard deviations ranging from 0.94 to 1.21. It is noteworthy that students expressed the highest confidence in their ability to cite and reference sources (EAW12). It can also be seen that the students were confident about writing a *critical overview of the relevant literature* (EAW9) which needs the students to cover all the relevant literature. Moreover, *paraphrasing* (EAW11) is a writing strategy which requires the writer to be well-equipped with a thorough understanding of what they have read first, so that they can synthesize significant information in an ethically appropriate manner to avoid committing plagiarism. Even though the EAW construct examined how the students self-assessed their writing abilities; writing a critical overview of the literature (EAW9), paraphrasing texts (EAW11) and knowing how to cite reliable sources (EAW12) are not possible to be carried out without proper consultation of all the directly related academic sources. Therefore, the students' EAW self-assessments are in line with their self-assessed scores in EAR.

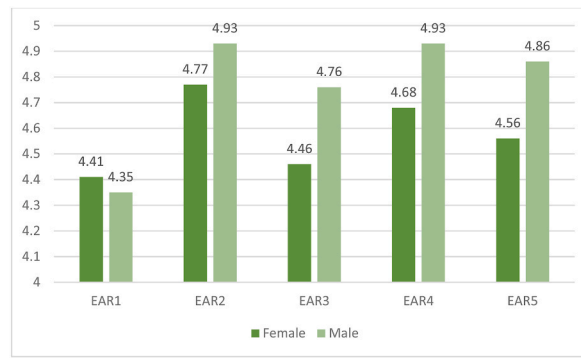


Fig. 2. Gender difference in the EAR assessments.

Table 6

Distribution of the EAR self-assessments by year of PhD study.

		strongly disagree (%)	disagree (%)	slightly disagree (%)	slightly agree (%)	agree (%)	strongly agree (%)
technical words or phrases (EAR1)	Y-1	4.3	7.5	22.6	23.7	24.7	17.2
	Y-2	1.6	7.8	4.7	23.4	50	12.5
	Y-3	2.1	6.5	6.5	17	36.9	30.4
	Y-4	4.6	13.9	4.6	18.6	30	27.9
	Y-1	0	7.5	8.6	23.7	32.3	28
the details in long complex texts without using a dictionary (EAR2)	Y-2	0	7.8	3.1	15.6	48.4	25
	Y-3	0	0	6.5	6.5	56.5	30.4
	Y-4	0	2.3	2.3	23	37	37
	Y-1	1.1	5.4	17.2	24.7	37.6	14
	Y-2	0	6.25	12.5	26.5	21	21.8
journal articles without rereading difficult sections (EAR3)	Y-3	0	2.1	10.8	13	45.6	28
	Y-4	0	4.6	4.6	16	41	32
	Y-1	1.1	5.4	26.9	25	45.2	14
	Y-2	0	0	3.1	26.5	48.4	21.8
	Y-3	0	0	4.3	17	43	34.7
critical thinking to determine how well a publication is researched (EAR4)	Y-4	0	2.3	6.9	18.6	37	34.8
	Y-1	0	5.4	9.7	34.4	36.6	14
	Y-2	0	1.5	3.1	28	48	18
	Y-3	0	1	5	7	18	15
	Y-4	0	2.3	36.9	18.6	44	27.9
critical thinking to decide the validity of arguments in a text (EAR5)							

Note. Y-1(1st-year PhD students), Y-2(2nd-year PhD students), Y-3 (3rd-year PhD students), Y-4 (4th-year PhD students).

4.3. RQ3. Relationship between EAR and EAW

The relationship between students' self-assessed English academic reading (EAR) and writing (EAW) abilities was investigated through a Pearson correlation analysis. The significantly strong and positive correlation ($r = 0.792, p < 0.001$) indicates that students who believe in their strong EA abilities tend to have similar views of their EAR comprehension. This relationship is visualized in Fig. 4.

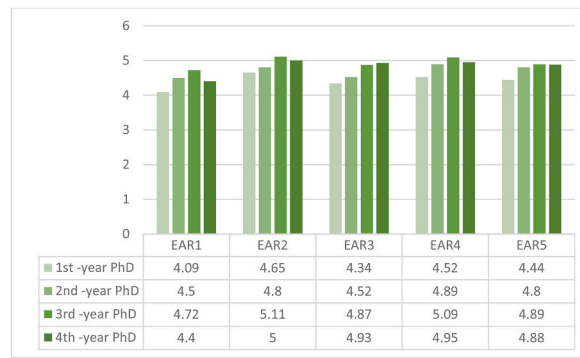


Fig. 3. Differences across academic years.

Table 7
Multiple comparisons among 1st-, 2nd-, 3rd- and 4th-year PhD students.

		(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	p	95 % Confidence Interval	
							Lower Bound	Upper Bound
EAR3	I can understand journal articles without rereading difficult sections.	1st-year PhD	4th -year PhD	-0.58615 ^a	0.20300	0.048	-1.1692	-0.0031
EAR4	I can use my critical thinking to determine how well a publication is researched.	1st -year PhD	3rd -year PhD	-0.57083 ^a	0.17013	0.012	-1.0595	-0.0822

^a The mean difference is significant at the 0.05 level.

Table 8
Self-assessed scores for English academic writing abilities.

	English academic writing abilities (EAW)	M	SD
EAW1	I can write clear, highly accurate and smoothly flowing complex academic texts.	4.49	1.14
EAW2	I can show flexibility in formulating ideas in differing linguistic forms to convey meaning precisely.	4.57	1.09
EAW3	I have a good command of specific vocabulary related to my larger field of study.	4.82	0.97
EAW4	I can create coherent and cohesive texts.	4.70	0.99
EAW5	I can use a wide range of connectors and other cohesive devices.	4.72	1.02
EAW6	I can demonstrate consistent and highly accurate grammatical control of complex language forms.	4.56	1.05
EAW7	Errors are rare in my texts.	4.25	1.21
EAW8	I can write clear, smoothly flowing, complex texts.	4.62	0.99
EAW9	I can write a critical overview of the relevant literature.	4.64	0.99
EAW10	I can write a publishable paper on an empirical study I designed and implemented.	4.65	1.00
<hr/>			
When I write in English, I have no difficulties with			
EAW11	paraphrasing texts	4.58	1.13
EAW12	citing and referencing sources	5.02	0.96
EAW13	organizing paragraphs	4.85	1.00
EAW14	Grammar	4.66	1.09
EAW15	special vocabulary	4.65	1.08
EAW16	writing paragraphs	4.79	1.06
EAW17	presenting ideas logically	4.78	0.96
EAW18	stating problems clearly	4.78	0.94
EAW19	summarizing key points	4.86	0.96
EAW20	drawing conclusions	4.80	1.00
EAW21	being critical	4.68	1.02
EAW22	using guidelines like APA or MLA	4.82	1.20

5. Discussion

The results of this study underscore the students' confidence in their English academic reading (EAR) abilities, as evidenced by their positive self-assessments during the survey. The spectrum of self-assessed mean scores exhibited a range across items assessing lexical knowledge. The lowest score pertained to EAR1, which addresses the comprehension of technical terms, while the highest score emerged for EAR2, pertaining to understanding sophisticated content in extended texts without depending on a dictionary. The mean score for EAR3, evaluating the ability to comprehend journal articles without rereading difficult sections, was slightly lower than those

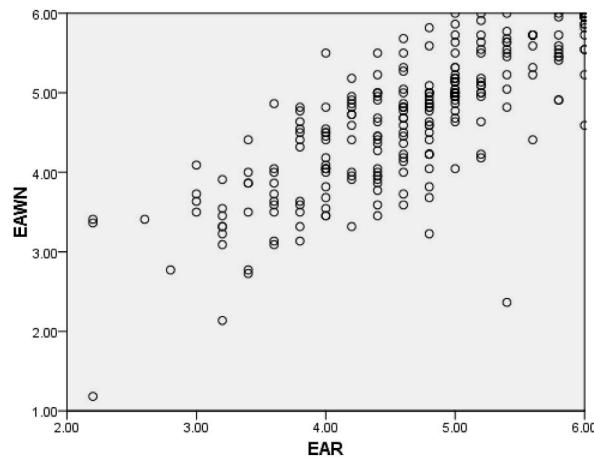


Fig. 4. Correlation between EAW and EAR

for items assessing critical thinking skills (EAR4 and EAR5). This discrepancy might be attributed to the study's focus on non-native English-speaking participants, the majority of them did not possess the most advanced language proficiency (C2). Consequently, linguistic comprehension (EAR3) may exhibit slightly lower scores, whereas critical thinking (EAR4 and EAR5) assessments could benefit from more advanced linguistic skills. Literature has consistently highlighted the pivotal role of English language proficiency in writing scholarly texts in English at an expected academic manner [4,12,18,30]. The analysis concerning English proficiency levels (C2, C1, and B2) revealed a positive correlation between language proficiency and self-assessed scores for reading academic materials. This finding underscores the significance of robust English proficiency for effective English academic reading and writing at the doctoral level, consistent with prior research [3,12,44].

Gender distinctions emerged in the data analysis, with male students expressing more confidence in their EAR abilities compared to their female peers. This aligns with past studies, such as those by Carter et al., Kurtz-Costes et al., and Yeganeh & Ghoreysi [60–62], which have highlighted gender-related discrepancies in doctoral academic performance. This gender-based variation resonates with the broader academic landscape.

Examining differences among academic years unveiled a developmental trajectory in students' self-assessed abilities. First-year doctoral students assigned themselves lower scores than their more advanced peers in the 2nd, 3rd, and 4th years, indicating enhanced academic competency as they progressed through their studies. This pattern echoes findings in previous studies [63–68] that showcase the iterative improvement in students' capabilities as they navigate their academic journeys.

Analysis of self-assessments on English academic writing (EAW) abilities illustrated high perceived proficiency among the students. Moreover, their strong self-assessed scores in items requiring efficient reading abilities (EAW9: critical literature review; EAW11: paraphrasing; EAW12: selecting reliable academic sources for in-text citations) were consistent with their EAR self-assessments. This alignment underscores a positive relationship between EAR and EAW, a correlation further substantiated by the strong positive Pearson correlation analysis result. This finding echoes existing literature [4,6,12,35,42,43], suggesting that consulting academic conventions within respective discourse communities helps student-researchers write scholarly texts at the PhD level.

In summary, 255 NNES international doctoral students in this study exhibited substantial confidence in their EAR abilities. These students felt adept at critically evaluating academic publications, a skill developed through their dissertation work and publication demands. The gender distinction revealed that male students held stronger beliefs about their EAR abilities. Furthermore, English proficiency emerged as a critical prerequisite for success in international PhD programs conducted in English. As students progressed in their doctoral studies, their confidence in EAR abilities grew. Importantly, a robust and significantly positive relationship between EAR and EAW abilities was evident in students' responses. These findings collectively shed light on the intricate interplay of language proficiency, gender dynamics, and academic progression in shaping students' self-assessments of their English academic reading and writing abilities.

6. Conclusion

The findings of this study provide invaluable insights into the self-assessed English academic reading (EAR) and writing (EAW) abilities of NNES doctoral students. These findings underscore a consistent trend of confidence in EAR abilities across diverse proficiency levels, concurrently shedding light on the impact of gender and academic progression on self-evaluations. Importantly, the significance of English proficiency emerges as a fundamental pillar for success in international PhD programs conducted in English, thus emphasizing its pivotal role in scholarly pursuits. The positive correlation observed between EAR and EAW capabilities underscores the intrinsic interdependence of these proficiencies within the academic domain. Consequently, this study significantly advances our comprehension of how NNES doctoral students perceive their linguistic competencies within the realm of advanced scholarly endeavors.

7. Limitations

While this study provides valuable insights into NNES doctoral students' self-assessed English academic reading and writing abilities, there are certain limitations that warrant consideration. Firstly, the self-assessment nature of the study relies on participants' subjective perceptions, which may be influenced by factors such as cultural background and individual biases. Additionally, the cross-sectional design captures a specific point in time and may not reflect the potential evolution of language abilities over the course of the students' academic journey. The study's focus on students who came from NNES contexts only; therefore, the findings of this study do not reflect the experience of students from different contexts. Moreover, due to the nature of voluntarily participation in the survey, the findings do not reflect the students who have left their peers behind, such as PhD dropouts.

8. Implications and future research directions

Despite its limitations, this study holds valuable implications for both educational practice and future research endeavors. Educators and academic institutions can draw upon the insights gained to design targeted interventions that enhance NNES doctoral students' language proficiency, particularly in the realms of English academic reading and writing. Strategies could include tailored language support programs, workshops, and resources that address specific areas of concern identified in this study, such as comprehension of technical terms, critical literature review, and paraphrasing skills. Furthermore, the observed positive relationship between EAR and EAW underscores the potential benefits of integrated approaches to language instruction that emphasize the synergies between these skills. Beyond the classroom, policymakers and curriculum designers can consider the significance of English proficiency as a foundational element of international PhD programs. As academic programs continue to attract diverse cohorts of students, understanding the role of language proficiency and its influence on self-assessment can inform decisions regarding admission criteria, language support initiatives, and academic expectations.

Future research endeavors can build upon this study's findings by employing longitudinal designs that capture the developmental trajectory of NNES students' language abilities throughout their academic journey, including their successes, failures, and personal strategies for academic skill development. Exploring the interaction between self-assessment, language proficiency, and academic performance can yield deeper insights into the mechanisms that shape students' perceptions and achievements. Additionally, investigating the factors underlying the differences in self-perceived abilities between male and female students could provide valuable insights. While conducting the survey, the majority of the participants in this study provided their email addresses to be contacted for interviews. Therefore, the students will be invited for follow-up interviews.

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Data availability

Data is available on request.

CRediT authorship contribution statement

Wai Mar Phyo: Writing – original draft. **Marianne Nikolov:** Writing – review & editing. **Ágnes Hódi:** Writing – review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Wai Mar Phyo reports financial support was provided by University of Szeged. Wai Mar Phyo reports a relationship with University of Szeged that includes: funding grants. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e34598>.

Appendix

Ethical approval

The Institutional Review Board (IRB) of the Doctoral School of Education, University of Szeged has recently reviewed your application for an ethical approval (Title of the Research Project: "How PhD students cope with academic writing requirements: A study of PhD students in the Doctoral School of Educational Sciences at the University of Szeged", supervisors: Dr. Marianne

Nikolov and Dr. Ágnes Hódi). This proposal is deemed to meet the requirements of the ethical conducts on social research with human subjects of the Doctoral School of Education, University of Szeged.

IRB decision: approved

Justification. The research project meets the requirements of the professional-ethical criteria of the social research including human subjects within the field of education science. Main goal of the study is to examine the English academic writing challenges that PhD students at the Doctoral School of Educational Sciences, University of Szeged, and analyze their influencing factors. Participants are 50 PhD students as well as their supervisors and tutors. No students under the age of 18 will participate in the study. Data are collected via Interviews and Questionnaires and Analyses of students' academic written texts by

using the tool for the automatic analysis of lexical sophistication (TAALES) before and after receiving feedback from supervisors and reviewers. Participation is voluntary and anonymous. Informed consent from the participants will be asked. Procedure of the data collection does not harm their privacy law, it does not have an impact on the participants' mental or physical health. Data cannot be handled by persons to whom they are not concerned.

In a summary, full ethical approval has been granted.

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