

DISCOURSE MARKERS IN POWERPOINT PRESENTATIONS BY ESP STUDENTS: AN INVESTIGATION OF SUSTAINABLE PRACTICES

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Abstract: *The literature in English for Specific Purposes (ESP) argues that the use of digital tools constitutes a sustainable teaching and learning practice in the field of ESP (Kohnke, Jarvis, & Ting, 2021). Microsoft PowerPoint is a digital tool that is routinely used by ESP instructors as well as ESP undergraduates. Whilst PowerPoint presentations form part of the ESP teaching and learning routine, there is insufficient knowledge about the repertoire of metadiscursive means, for instance, discourse markers (DMs), which are used by ESP undergraduates on the slides of their PowerPoint presentations. In an attempt to generate new knowledge on this matter, this contribution describes a study whose aim is to establish how a group of ESP undergraduates (further – participants) uses DMs on the slides of their PowerPoint presentations. The study employs an intraparticipant research design to shed light onto the occurrence of DMs on the participants' PowerPoint slides during (i) the explicit and (ii) implicit modes of instruction associated with the teaching and learning of DMs. This is done in order to contrast these two teaching and learning conditions and look into whether or not the participants' use of DMs on the PowerPoint slides is sustainable. The results of the quantitative analysis reveal that the participants use DMs (i) and, (ii) as, (iii) but, (iv) however, and (v) so sustainably in all the experimental conditions. However, apart from the aforementioned DMs, their use of DMs in the implicit mode of instruction is not sustainable. The study provides linguo-didactic implications that are relevant to the sustainable teaching and learning of DMs in PowerPoint presentations by ESP undergraduates.*

Keywords: *discourse markers (DMs), English for Specific Purposes (ESP), ESP writing, PowerPoint presentation, sustainable practices*

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Introduction

The literature in the field of English for Specific Purposes (ESP) regards digital tools as a form of sustainable ESP practices given that they facilitate the accessibility and effectiveness of the teaching and learning process (Kakoulli-Constantinou & Papadima-Sophocleous, 2020; Kapranov, 2020a; Sinkus & Ozola, 2024). Specifically, digital tools are involved in the creation of long-lasting educational outcomes, which are relevant to ESP undergraduates (Kapranov, 2020b; Marcu, 2021). Accordingly, a number of studies in ESP link the notion of sustainability in the ESP teaching and learning contexts to the extensive use of digital tools (e.g., PowerPoint) and digital artefacts (Hurajová & Chmelikova, 2025; Mao & Zhou, 2024). One of the digital tools that ESP undergraduates should master is Microsoft PowerPoint, which is employed to create a digital presentation that involves slides that may contain textual fragments and multimedia elements afforded by Microsoft templates (Thakur, 2022, p. 4).

It should be observed that PowerPoint presentations by ESP undergraduates have attracted researchers' attention in the field of ESP studies (Bărbuceanu, 2020; Feng, 2020; Ferreira et al., 2018; García-Sánchez, 2019; Giang, 2024; Kovačević, 2023; Milosevic, 2015; Negoescu, 2022; Tsai, 2010; Zašcerinska, 2009). Interestingly, the bulk of studies on ESP undergraduates' PowerPoint presentations does not seem to focus much on the writing component, that is on what and how ESP undergraduates write on the slides of their presentations (Hyland, 2022, 2025; Hafner et al., 2023; Radosavlevikj, 2023). Particularly, ESP writing on PowerPoint slides is fairly under-researched (Bloch, 2013), whereas the use of PowerPoint by ESP students for oral purposes is profusely discussed in the literature (Milosevic, 2015). Furthermore, it should be emphasised that, to the best of our knowledge, there is no published research that investigates whether or not ESP undergraduates use metadiscursive means, for instance, discourse markers (DMs) in their writing on PowerPoint slides. In this regard, it should be mentioned that DMs can be defined as “words like *oh, well, and, but, or, so, because, now, then, I mean, and y'know*” (Schiffrin, 1987, p.3), which “signal the semantic relationship between adjoining discourse segments” (Fraser, 2013, p. 318).

Against this background, we propose a quantitative study whose research aim consists in shedding light on whether or not ESP undergraduates use DMs on their PowerPoint slides. Given that such research topic is fairly novel, we specifically want to underscore the fact that we focus our investigation on what a group of ESP undergraduates who major in computer sciences (further in the article referred to as “participants”) write on the slides of their PowerPoint presentations.

Accordingly, the present study aims at establishing the frequency of the occurrence of DMs on the slides of several PowerPoint presentations, which have been delivered by the participants in a set of experimental conditions.

Particularly, the experimental conditions are comprised of (i) the pretest at the start of the semester, (ii) Round 1 in the middle of the semester, and (iii) Round 2 at the end of the semester. By means of applying the intraparticipant design, we look at the frequency of the occurrence of DMs on the participants' PowerPoint slides written in (i) the explicit mode of instruction of DMs in Round 1 and (ii) the implicit mode of instruction in Round 2. We juxtapose the frequency of the occurrence of DMs in the aforementioned two modes in order to provide an estimate of the participants' sustainable practices associated with the use of DMs on the slides of their PowerPoint presentations. From this perspective, the study sets out to answer the following research question (RQ):

RQ: How sustainable is the use of DMs on the slides of the participants' PowerPoint presentations?

Further, this article proceeds as follows: First, we present an overview of the literature on PowerPoint presentations in ESP contexts. Second, we outline some of the theoretical tenets related to ESP writing. Third, we provide an outline of the literature on DMs in ESP writing. Fourth, we introduce and discuss the present study in detail. Finally, we conclude the article with a range of linguo-didactic implications that could be relevant to the field of ESP.

PowerPoint Presentations in ESP Contexts: Literature Review

There seems to be abundant research on PowerPoint presentations in ESP contexts (He & Pramoolsook, 2026). Arguably, the literature on PowerPoint presentations in ESP settings could be grouped around the following research foci: (i) challenges for ESP students, (ii) oral skills, and (iii) writing skills (Bărbuceanu, 2020; Feng, 2020; Ferreira et al., 2018; García-Sánchez, 2019; Giang, 2024; Kovačević, 2023; Milosevic, 2015; Negoescu, 2022; Tsai, 2010; Zašcerinska, 2009).

Concerning the focus on PowerPoint presentations and challenges to ESP students, Gian (2024), Negoescu (2022), and Tsai (2010) demonstrate that delivering a PowerPoint presentation poses such problems as the misuse of the PowerPoint (e.g., unclear presentational structure) and the lack of confidence in presenting orally in front of the class. Specifically, Tsai (2010) posits that ESP students "with different English proficiencies have different concerns about giving a presentation". Elaborating upon different concerns, Tsai (2010) notes that ESP students may experience such challenges associated with an orally delivered PowerPoint-based presentation as (i) problems with English pronunciation and intonation, (ii) substandard reading skills, and (iii) ineffective time management, to name just a few. Furthermore, Feng (2020) and Gian (2024), respectively, show that an excessive use of PowerPoint functions may pose a challenge for ESP students, who may prioritise the form of their presentations over their respective content. For instance, Feng (2020, p. 177)

argues that PowerPoint presentations “should not become a fancy tool for an old pedagogy (i.e., teacher-centred transmission of content knowledge); instead, it should be used to enhance students’ competence in meaning making”.

The relationship between PowerPoint presentations and ESP undergraduates’ oral skills is investigated by García-Sánchez (2019), who affirms that a PowerPoint presentation facilitates ESP students’ communicative strategies. Similar observations are also reported by Ferreira, Santos, and Serpa (2018) who point to a positive effect of using PowerPoint presentations in university settings in general and ESP courses in particular. Analogously, Zašcerinska (2009) argues that the use of PowerPoint presentations promotes ESP students’ communicative competences in English. She problematises their use in ESP contexts as an opportunity for developing ESP students’ communicative skills.

Regarding the research focus on PowerPoint presentations and writing, Milosevic (2015) maintains that ESP practitioners should train their students to write professional PowerPoint presentations that meet the specifics of the writing style commonly used in their future professions. She argues that writing presentations may facilitate ESP students’ writing skills. Similarly, Kovačević (2023) suggests that the writing of a PowerPoint presentation may exert a beneficial effect on ESP students’ written proficiency in English. Likewise, Bărbuceanu (2020) asserts that the process of writing a PowerPoint presentation provides ESP students with a sense of gratification and ownership of their achievements.

Writing in ESP Settings: Some Theoretical Considerations

First of all, we should note that ESP is defined as “the teaching and learning of English as a second or foreign language where the goal of the learners is to use English in a particular domain” (Paltridge & Starfield, 2013, p. 2). Particularly, the goal of ESP is to provide language instruction that is tailored to the students’ specific language learning needs and purposes (Belcher, 2009, p. 1; Hyland & Jiang, 2021, p.13). The need to teach and foster writing skills is considered a critical element in ESP contexts (Baştürkmen, 2021; Hyland, 2013; Mao & Zhou, 2024; Roothoof et al., 2025).

As far as ESP writing skills are concerned, the literature emphasises that ESP students should acquire and develop the notion of genre (Cheng, 2021; Flowerdew, 2016; Hyland, 2022) in the course of their studies. According to Hyland (2013, p. 98), “genres in ESP are usually regarded as staged, structured events, designed to perform various communicative purposes by specific discourse communities”. Against this background, a genre-based approach to the teaching of undergraduate ESP writing should “focus on assisting students towards competence in particular target genres” (Hyland, 2013, p. 96), which is seen as a locus of the typified language use that marks communication with the other members of a social and/or professional group (Cheng, 2021).

The notion of genre in relation to fostering ESP students' writing skills should be reflected in ESP curriculum design and materials development (Belcher, 2009; Cheng, 2021). Particularly, Cheng (2021) and Hyland (2013) posit that the genre-based approach to ESP writing should involve a focus on the discursive, grammatical, and lexical means associated with particular genres. Specifically, Cheng (2021) maintains that the lexico-grammatical means represent a critically important component in ESP writing. Furthermore, she contends that the lexico-grammatical means are inseparable from rhetorical contexts in the ESP genre-based approach. Cheng's (2021) contention is echoed by Hyland (2022), who unpacks the nexus between the lexico-grammatical means and the rhetorical organisation of ESP writing as a set of rhetorical moves in the sense postulated by Swales (2004). Whilst it is, obviously, beyond the scope of this rather short outline to dwell upon the Swalesian (2004) rhetorical moves analysis, it should be mentioned that he defines moves as "discoursal or rhetorical unit that performs a coherent communicative function" (Swales, 2004, pp. 228-229). In this regard, Samraj (2014) indicates that the Swalesian analysis of moves is commonly included in the genre-based approach to ESP writing pedagogy.

Whereas the present outline of theoretical considerations associated with ESP writing is far from exhaustive, it, nevertheless, captures the current focus on genre in ESP writing. Moreover, the outline conveys the importance of teaching discursive, grammatical, and lexical means that are genre-specific. Arguably, DMs can be rightfully included in the genre-specific discursive means that define ESP writing. Further, we present an overview on the literature on DMs in ESP writing.

DMs in Undergraduate ESP Writing: An Overview of Prior Studies

There are different labels for the term DM, for instance, pragmatic markers, discourse particles, and discourse operators, to name just a few (Fischer, 2014; Kapranov, 2017). Accordingly, several definitions of DMs have been proposed in the fields of applied linguistics, discourse studies, and ESP (Kapranov, 2019). For instance, Schiffrin (1987, p. 31) contends that DM are defined as "sequentially dependent elements which bracket units of talk". The sequential element that joins the two discursive segments is foregrounded in the definition of DMs proposed by Fraser (1999), who argues that DMs

impose a relationship between some aspect of the discourse segment they are a part of, call it S2, and some aspect of a prior discourse segment, call it S1. In other words, they function like a two-place relation, one argument lying in the segment they introduce, the other lying in the prior discourse. I represent the canonical form as <S 1. DM+S2>. (Fraser, 1999, p. 938)

Let us illustrate how Fraser's (1999) definition is applied to the identification of DMs. To this end, let us consider the following two sentences: (i) "A: I like him. B: *So*, you think you'll ask him out then" (Fraser, 1999, p. 931) and (ii) "I

like him *so* much”. In (i), *so* is argued to be a DM, since it is employed in the sentence-initial position in order to join the two sentences. In (ii), however, *so* is not deemed to be a DM given that it is not used to join clauses or sentences.

It should be noted that DMs in undergraduate ESP writing are described in a rather limited number of research publications (Alahmed & Kırmızı, 2021; Lu, 2023; Radonja, 2019; Schiffrin, 1986, 1987; Vesić Pavlović & Đorđević, 2020), which address the use, frequency and typical errors associated with DMs. For instance, Alahmed and Kırmızı (2021) show that contrastive DMs (e.g., *but*) are frequently employed by undergraduate ESP students whose first language (L1) is Arabic. In addition, Alahmed and Kırmızı (2021) demonstrate that Arabic L1 ESP students overuse such DMs as *and*, *as*, *or*, *but*, and *so*. In a similar fashion, Lu (2023) posits that undergraduate ESP students whose L1 is Chinese overuse such contrastive DMs as *although*, *however*, *but*, *on the other hand*, *conversely*, and *otherwise*. Another area of concern reported by Lu (2023) involves the misuse of self-assessment DMs *in my opinion*, *as far as I am concerned*, *I think*, *I believe*, *as for me*, and *in my view*. In unison with Lu (2023), Siu, Afzaal, and Aldayel (2024) show that academic writing by Chinese L1 ESP undergraduates is characterised by a relatively frequent use of the DMs that contain self-mention phrases, for instance, *we believe*, *from our perspective*, etc.

In a comparable way, Radonja (2019) demonstrates that Serbian L1 ESP undergraduates overuse the following DMs in their writing: *however*, *but*, *and*, *so*, *on the other hand*, *since*, *while*, *though*, and *also*. Radonja’s (2019) findings correspond to the results of the study conducted by Vesić Pavlović and Đorđević (2020), who have found that the most frequently occurring DMs in ESP writing by Serbian L1 ESP undergraduates are represented by elaborative DMs (e.g., *and*), contrastive DMs (e.g., *however*), and DMs that are indicative of consequence, for instance, *thus*, *therefore*, and *in conclusion*. Furthermore, Vesić Pavlović and Đorđević (2020) posit that certain DMs are excessively used by the participants in their study, namely *and*, *but*, *so*, *for example*, and *such as*. Also, Vesić Pavlović and Đorđević (2020) indicate that the self-assessment DMs that involve self-mentions (for instance, *I think*, *I assume*, *I expect*) appear to be overused.

Whilst the literature addresses the frequency, use, and misuse of DMs in ESP undergraduate writing, there are no published studies on DMs in ESP undergraduates’ PowerPoint presentations. Further, we present a quantitative study that aims at narrowing the current research gap.

The Present Study: Theoretical Considerations

There are several theoretical cornerstones we build our study on. Firstly, the study is informed by the literature (Flowerdew, 2016; Hyland, 2022), which indicates that ESP undergraduates should master a range of crucial skills, especially

writing skills, that would enable them to conduct an efficient and successful PowerPoint presentation. Another cornerstone of the study is represented by the notion of genre, which is regarded as a class of communicative events that share a set of communicative purposes (Swales, 2004). Furthermore, the study considers the factor of multimodality in the genre of PowerPoint writing (Askehave & Nielsen, 2005; Flowerdew, 2016; Kapranov, 2022; Paltridge, 2013), which intersects with genre conventions of ESP writing afforded by traditional non-digital media. Finally, we should mention that the study is anchored in the theoretical tenets of sustainability. We argue that sustainability in ESP contexts is manifested by a variety of aspects (Kapranov, 2018). One of them is represented by the use of digitalisation, digital tools, and digital artefacts, which make the process of ESP teaching and learning easy, convenient, long-lasting, and, to an extent, environmentally-friendly (Kapranov, 2021). In this regard, we consider the use of PowerPoint a manifestation of sustainable practices.

Apart from the view of digital tools as sustainable means associated with the ESP teaching and learning process, we problematise sustainability as a factor that is concomitant with an ESP student's learning trajectory (Kapranov & Voloshyna, 2023). Let us, perhaps, dwell upon the latter view of sustainability in more detail. Our approach to sustainability in the ESP undergraduate's learning curve harkens back to the seminal publication by Kirsner and his colleagues (2007), who argue that in order for a foreign language (FL) skill to be sustainable, an FL learner must have had a certain amount of language practice measured in hours (Kapranov, 2013). According to Kirsner et al. (2007), sustainable FL skills do not compromise and/or lead to a sudden deterioration of the acquired FL skills within a certain period of time, i.e., they stay relatively stable. In our case, for example, we argue that if we teach English DMs to our undergraduates for, let us say, one semester, we assume that for their DM-related skills to be regarded as sustainable, the ESP undergraduates should, at least, show the retention of DMs in the next semester. Guided by these considerations, we have formulated the RQ of the study and presented it in the introduction.

Participants, Corpus, and Procedure

In terms of the participants of the study, the following should be explained. The study involves a group of participants (total number = 15), who are second year ESP undergraduates (all males, mean age 18.9, standard deviation 0.8). All of them major in computer sciences at a university in Ukraine. They have already had a year of ESP studies (two semesters) prior to taking part in our study. The participants' L1 is Ukrainian and English is a foreign language to all of them. The participants are provided with the information sheet that describes the experiment and its purpose. The participants are requested to sign consent forms that allow the authors of the article to collect and analyse the

participants' PowerPoints (slides only, no video and no sound) for research and publication purposes. The participants' real names are coded in order to ensure confidentiality (the code P plus numbers from one to fifteen are used to conceal the participants' identity in the study).

It should be reiterated that our study focuses on DMs that are written on the slides of the participants' PowerPoint presentations. As mentioned, we do not analyse the oral component of the participants' PowerPoints, which should be examined in a separate study. The present investigation, however, is centred on the identification and quantification of DMs in the following three tasks: (i) the pretest, which takes place at the start of the semester. The pretest task is assumed to be indicative of the participants' use of DMs prior to their second year of ESP studies; (ii) Round 1, which is conducted in the middle of the semester. During Round 1, the participants are exposed to the explicit mode of the teaching and learning of DMs. Particularly, the participants are taught explicitly the genre-appropriate use of the following DMs: *according to, and, as, after all, at the same time, because, but, however, if, in addition, in general, on the one hand, on the other hand, or, so, such, and therefore*; (iii) Round 2, which is carried out at the end of the semester, when the topic of DMs is not addressed explicitly, and there are no specific exercises associated with the use of DMs. We regard Round 2 as a litmus test of the participants' sustainable learning practices associated with the use of DMs on the slides of their PowerPoint presentations.

In terms of the procedure, the participants were offered to deliver a PowerPoint presentation on the topic "My Favourite Day during My Internship" in the pretest. The participants were given the topic "My Favourite Company" in Round 1, whereas the topic "Corporate Communication with My Favourite Company" was assigned to them in Round 2. In all three tasks, the participants were allowed to have five working days to prepare their PowerPoint presentations and deliver them via Zoom. Additionally, the participants were requested to send their PowerPoint slides to the authors of the article via e-mail. The descriptive statistics of the participants' writing on their PowerPoint slides (i.e., the corpus of the study) were summarised in Table 1 below.

Table 1. *Descriptive Statistics of the Corpus*

#	Descriptive Statistics	Pre-test	Round 1	Round 2
1	Total number of words	3 814	5 082	5 906
2	Mean words	254.3	338.8	393.7
3	Standard deviation words	72.7	89.0	159.6
4	Total number of slides	122	158	146
5	Mean slides	8.1	10.5	9.7
6	Standard deviation slides	1.1	4.1	4.3

The corpus was analysed for the presence of DMs using the computer software AntConc (Anthony, 2022), which computed the frequency of DMs per file per participant. To that end, each PowerPoint presentation was converted to a Word file and processed as such in AntConc (Anthony, 2022). The results of the computer-assisted investigation of DMs were manually checked for omissions and misclassifications. Thereafter, the frequencies of DMs were processed in the Statistical Package for Social Sciences (SPSS), version 20.0 (IBM, 2011), which calculated means (M) and standard deviations (SD) of the DMs in each task.

Results and Discussion

The quantitative analysis of the data reveals that the participants employ 27 DMs (M 3.4, SD 3.0) in the pretest task, 52 DMs (M 3.1, SD 3.1) in Round 1, whereas in Round 2 they use 38 DMs (M 3.2, SD 3.1). The descriptive statistics of the frequency analysis of DMs are given in Table 2 below.

Table 2. *Frequency of Occurrence of DMs in the Corpus*

#	DMs	Pretest	Round 1	Round 2
1	According to	0	4 (M 1.0, SD 0)	0
2	After all	1 (M 0, SD 0)	0	0
3	And	11 (M 1.8, SD 0.7)	13 (M 1.3, SD 0.5)	12 (M 1.1, SD 0.3)
4	As	3 (M 1.0, SD 0)	1 (M 0, SD 0)	6 (M 1.0, SD 0)
5	At the same time	0	1 (M 0, SD 0)	0
6	Because	2 (M 1.0, SD 0)	0	0
7	But	4 (M 0, SD 0)	5 (M 1.3, SD 0.4)	4 (M 1.0, SD 0)
8	Firstly	0	1 (M 0, SD 0)	0
9	First of all	0	1 (M 0, SD 0)	0
10	For example	0	5 (M 1.7, SD 0.9)	0
11	However	2 (M 1, SD 0)	6 (M 1.5, SD 0.9)	2 (M 1, SD 0)
12	If	0	3 (M 1.0, SD 0)	2 (M 1.0, SD 0)
13	In addition	0	1 (M 0, SD 0)	1 (M 0, SD 0)
14	In general	0	2 (M 0, SD 0)	2 (M 0, SD 0)
15	Normally	0	1 (M 0, SD 0)	0
16	On the other hand	0	1 (M 0, SD 0)	1 (M 0, SD 0)
17	Or	0	1 (M 0, SD 0)	4 (M 1.0, SD 0)
18	Secondly	0	1 (M 0, SD 0)	0
19	So	1 (M 0, SD 0)	5 (M 1.3, SD 0.4)	2 (M 1.0, SD 0)
20	Sometimes	0	0	1 (M 0, SD 0)
21	Such	0	1 (M 0, SD 0)	1 (M 0, SD 0)
22	Then	3 (M 1.0, SD 0)	0	0
23	Therefore	0	2 (M 0, SD 0)	0
24	Thirdly	0	1 (M 0, SD 0)	0

From a broader perspective, we can see from the results that all the participants have managed to produce all three sets of PowerPoints. As indicated earlier in the article, we tend to regard Microsoft PowerPoint and other digital tools as sustainable means of the ESP teaching and learning process (Kapranov, 2021, 2022). Also, as mentioned, we treat sustainability in ESP from a narrower perspective, which in line with Kirsner et al. (2007) presupposes a process of skill retention in the learner's trajectory of ESP-related experiences (Kapranov, 2013). As far as the view of sustainability in the use of DMs on the slides of the participants' PowerPoints is concerned, we have to state that their acquisition of DMs is not sustainable in Round 2. We will come to this statement later in the discussion.

Let us, for now, discuss the DMs in all three tasks and relate our findings to the literature in the field of ESP. It follows from Table 2 that the participants' repertoire of DMs in the pretest is rather limited. Indeed, this task involves only eight types of DMs. Among them, the DMs *and* and *but* are the most frequently occurring ones. This finding lends support to the literature (Alahmed & Kırmızı, 2021; Lu, 2023; Radonja, 2019; Vesić Pavlović & Đorđević, 2020), which points to the extensive use of the aforementioned DMs in undergraduate ESP writing.

Judging from Table 2, the participants employ the DMs *and*, *as*, *but*, *however*, and *so* rather consistently in all three tasks. This observation is further supported by the one-way analysis of variance (one-way ANOVA), which indicates that there is no significant difference between the means of any pair among *and*, *as*, *but*, *however*, and *so*, namely [$F(2, 14) = 0.4511$, $p = 0.6473$]. Arguably, the DMs *and*, *as*, *but*, *however*, and *so* form a staple set of DMs that the participants acquired during their secondary school studies, given that there was no explicit ESP instruction associated with DMs during their first year of study at the university.

In terms of the frequency of DMs in Round 1, it follows from Table 2 that *and* is the most frequently occurring DM in this round. The finding lends support to the literature (Alahmed & Kırmızı, 2021; Lu, 2023; Radonja, 2019; Vesić Pavlović & Đorđević, 2020), which indicates that *and* is one of the most commonly used DMs that ESP students overuse. The analysis of the corpus reveals that in Round 1 two out of 15 participants use *and* in the introductory part of their PowerPoint presentations, whilst 13 participants employ *and* in the main part of their presentations. Notably, all participants utilise the DM *and* exclusively in the main part of their PowerPoint presentations in Round 2. Typically, the occurrence of *and* is localised in the multimodal discursive space of the slide, which is usually manifested by a textual fragment plus a visual element that is invariably represented in the present corpus by a digital picture.

Interestingly, other frequently occurring DMs such as *but*, *however*, *or*, and *so*, are found, predominantly, in the main sections of the participants' PowerPoint presentations with the exception of three presentations written by participants

P5, P11, and P9 in Round 2. These participants employ *but*, *however*, and *so* on the initial slides of their presentations. Identically to the DM *and*, *but* occurs in both Round 1 and Round 2 in the multimodal context that involves a textual piece and a digital picture. These findings are evocative of Askehave and Nielsen (2005) as well as Paltridge (2013), who suggest that the discursive space of PowerPoint is typically represented by a combination of textual and pictorial elements.

Our findings, so far, are in line with Hyland (2013), who refers to the genre-appropriate use of metadiscursive means inclusive of DMs. According to Hyland (2013), DMs play a critical role in facilitating coherence and authorial stance in the piece of ESP writing. Assuming that DMs form an intrinsic part of genre-appropriate ESP writing (Hyland, 2022), the occurrence of DMs in the corpus could be indicative of the participants' endeavour to conform to the style of ESP writing executed in the form of PowerPoint presentations. If this line of reasoning is correct, we may posit that the presence of DMs on the participants' PowerPoint slides is genre-appropriate.

The findings summarised in Table 2 reveal that the participants seem to employ fewer DMs in Round 2. In addition to the decrease in the overall frequency of the occurrence of DMs, we observe a qualitative decline in the types of DMs used in Round 2. Specifically, the participants do not employ such DMs as *according to*, *at the same time*, *firstly*, *first of all*, *for example*, *normally*, *secondly*, *therefore*, and *thirdly*. To reiterate, the participants' PowerPoint presentations in Round 2 eventuate in the teaching and learning context that is characterised by the absence of input associated with DMs within the timeframe of the second half of the semester. In other words, one month and a half without the explicit mode of the teaching and learning of DMs in ESP writing results in a rather impoverished repertoire of DMs on the one hand and a perceptive decline in the frequency of the occurrence of DMs on the other hand. Based upon the data garnered from the analysis of the participants' PowerPoint presentations in Round 2, we argue that the absence of explicit instruction concerning DMs in ESP writing correlates with quantitative and qualitative decreases in the use of DMs on the participants' PowerPoint slides.

The decrease in the frequency of DMs in Round 2 may be suggestive of the problems that the participants experience with DMs and, perhaps, with other metadiscursive means. Put differently, the participants' use of DMs is evocative of the challenges that they encounter in their PowerPoint presentations as far as DMs are concerned. This observation is supported by the literature (Feng, 2020; Giang, 2024; Negoescu, 2022), which demonstrates that PowerPoint presentations may be associated with insufficient mastery, misuse and/or problems with writing skills, which in our case come to the fore in the form of the notable decrease in the frequency and range of DMs. In addition, we tend

to interpret the findings from Round 2 as a piece of evidence that indicates that the period of time of one month and a half results in unsustainable writing skills associated with the use of DMs. The findings are suggestive of a number of linguo-didactic implications that we further present in the conclusions section of the article.

Conclusions

Judging from the results, we found that the participants responded positively to the explicit mode of instruction associated with DMs in ESP writing. In their PowerPoint presentations, they exhibited a rather broad range of DMs, with the most frequently occurring DM *and*, and a group of other DMs that occurred relatively frequently, such as *but*, *however*, *or*, and *so*. However, the participants' benefits from the explicit mode of instruction related to DMs in ESP writing turned out to be unsustainable from a long-term perspective. Based upon the results, we established that the participants narrowed the range of DMs in their PowerPoint presentations in Round 2 and used them less frequently.

The findings were suggestive of the following linguo-didactic implications: First, the use of DMs in ESP writing should be explicitly taught to undergraduate ESP students. Second, the duration of the explicit mode of the teaching and learning of DMs within an ESP course should be, at least, one full semester. Third, PowerPoint presentations should be conducted, if possible, twice a semester in order to focus on the way ESP students use such metadiscursive means as DMs. The aforementioned linguo-didactic suggestions might contribute not only to the research field of ESP writing, but to EFL writing in general by raising the researchers' and ESP students' awareness of and attention to such metadiscursive means as DMs. Hopefully, the results of the study might contribute to designing and planning a course in ESP writing as well as other ESP-related modules in tertiary instructional settings.

Finally, we should enumerate several limitations of the study. First of all, the study focused exclusively on the written component of PowerPoint presentations. It would be beneficial for future research to factor in the oral component and analyse the use and occurrence of DMs in the written and oral parts of a PowerPoint presentation. Second, our study involved the cohort of male participants only. It would be advisable in the future studies to recruit a gender-balanced group of participants. Alternatively, it would be pertinent to recruit a male-only group of participants and contrast their PowerPoint presentations with those of a female-only control group in order to uncover potential differences associated with the frequency of DMs.

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