

Calibrating digital method integration into ESP courses according to disciplinary settings

Madalina Chitez*, Department of Modern Languages and Literatures, West University of Timisoara, 300223 Timisoara, Romania <https://orcid.org/0000-0001-9005-3429>

Loredana Bercuci, Department of Modern Languages and Literatures, West University of Timisoara, 300223 Timisoara, Romania <https://orcid.org/0000-0003-1124-6279>

Suggested Citation:

Chitez, M. & Bercuci, L. (2020). Calibrating digital method integration into ESP courses according to disciplinary settings. *New Trends and Issues Proceedings on Humanities and Social Sciences*. 7(1), pp 20–29. 10.18844/prosoc.v7i1.4862

Received from November 5, 2019; revised from March 18, 2020; accepted from June 16, 2020.

Selection and peer review under responsibility of Assoc. Prof. Dr. Jesus Garcia Laborda, University of Alcala, Spain.

©2020 Birlesik Dunya Yenilik Arastirma ve Yayıncılık Merkezi. All rights reserved.

Abstract

This study aims to analyse the effects of a digitally enhanced teaching strategy in an ESP course. The intervention method consists of guided corpus linguistics exercises which are progressively introduced to improve the students' academic writing. We collected data from various task-based corpus processing, consultation and analysis stages, each one having a different complexity level: compilation of a discipline-specific expert corpus, consultation of a native speaker English corpus and analyses of both types. The pre- and post-intervention results are quantitatively and qualitatively assessed, controlling for discipline specificity. The results of a corpus consultation satisfaction survey are also included in the analysis. We conclude that corpus consultations not only lead to the improvement of ESP students' writing but also increasing student motivation. The recommendation is to first test the digital methods in ESP courses and calibrate them according to disciplinary settings.

Keywords: Academic English, ESP, corpus consultation, digital methods.

* ADDRESS FOR CORRESPONDENCE: Madalina Chitez, Department of Modern Languages and Literatures, West University of Timisoara, 300223 Timisoara, Romania. E-mail address: madalina.chitez@gmail.com / Tel.: +0-000-000-0000

1. Introduction

Teaching academic writing in ESP courses, although implicitly evaluated, is not allotted sufficient tasks and time in textbooks used in the English for Specific Purposes classes. This is the case, at least, for the Romanian academic settings. Whilst university teachers acknowledge the importance of providing their students with a set of academic competences, including appropriate rhetoric strategies for written tasks, the methodologies at hand are more or less concerned with general and discipline-specific language challenges. Students, in their turn, are confused about the requirements of the course, considering that most of the activities are exercises focusing on Lexico grammatical or profession-relevant oral communication topics. Not to mention the fact that, if undergraduate students are only collaterally disadvantaged by not mastering academic writing skills in English, e.g., poorer academic grades, graduate students are immensely disadvantaged when confronted with the rather intensive research-based papers in their master's or doctoral studies. In this context, testing new and efficient academic writing exercises is the path for adapting the ESP courses to the real-life challenges that students are facing or will face in their academic or professional career (Gokbulut, 2020).

Corpus linguistics has been exploited for a long time now in all the fields of the humanities and beyond: it has proved its usefulness in the matters of data-intensive linguistic research, as well as in numerous varieties of language teaching or interdisciplinary approaches that involve language assessment (computational linguistics, forensic linguistics, historic linguistics, etc.). Corpus-based academic writing studies have also flourished (e.g., Cortes, 2018) and emphasised the importance of using corpora for AW improvement. In Romania, with few exceptions (e.g., Chitez, 2018 and Chitez & Bercuci, 2019) the applied corpus linguistics, i.e., corpus linguistics used for offering practical solutions to teachers, students and digital users, is still a highly under-research field. In this paper, we aim to create a replicable model of corpus-based teaching strategy for AW in ESP.

2. Academic writing in Romania

Academic writing in Romania has undergone many changes in recent years. In the past, if Romanian universities and, implicitly, Romanian research writing were based on the French and later on the Soviet model, today, they are gravitating towards Anglo-American norms. Currently, the increasing impact of the UK and US models is drawing more attention from researchers in the humanities 'due to factors such as the internationalisation of higher education, the widespread use of English in scientific and professional communities and, since 2007, EU accession and the increased mobility of academics, researchers and students' (Borchin & Doroholschi, 2016, p. 179).

The students who participated in this study had already taken a compulsory academic writing course in Romanian. During informal interviews, they shared convictions about academic writing, which is similar to those discovered by the previous studies on the topic, i.e., writing should be 'implicit, "author oriented", "concerned with style", lacking theoretical reflection and an appropriate methodological approach' (Baniceru, Borchin, Doroholschi & Tucan, 2012, p. 321). However, they were also aware of some Anglo-American academic genre norms, such as rhetorical moves in introductions (introducing the topic, stating the aim of the paper and presenting the structure of the paper) or cohesive devices used to link the parts of the text. The participants in this study appeared to have a relatively shallow understanding of the audience or purpose of research and academic writing and how these might affect its structure. Overall, they had learned many of the genre 'rules' mechanically (Eraslan & Kukuoglu, 2019).

3. Method

In this study, we focus on measuring the impact of using corpora for academic writing tasks in ESP courses. Since the students are introduced to corpus linguistics methods and practices for the first time, we needed to expose them to several types of corpora. In this way, a comparison of the effects of

each corpus use, as perceived by students or based on datasets, can be drawn, and the results can be pedagogically exploited. Again, given the fact that this is a new learning approach for course participants, a selection of guided exercises seemed more appropriate than mere inductive-learning corpus-informed activities.

3.1. Corpus intervention design

The intervention study was conducted in the frame of the programme Geography for Tourism and International Relations and European Studies at the West University of Timisoara in Romania, as part of a compulsory English for Specific Purposes course. Students use English as their L2 or L3, and their first language is Romanian. The general language level of all students was B1/B2.

Table 1. Teaching context of the corpus intervention study.

(1).The students were asked, at the beginning of the semester, to choose a research topic and find one or two academic studies that they would use as a reference to write a paper on that topic.
(2).In class, the students were asked to write a first draft of the introduction to their research paper or a short position paper on which to base their research paper.

Whilst they were preparing for their writing task, the students were introduced to the methodology of corpus construction, consultation and analysis, in gradual stages. Thus, the subtask of selecting two academic studies for a research paper was turned into a corpus collection process: the expert corpora PolSciEX (29 texts) and TourEXP (25 texts) were compiled.

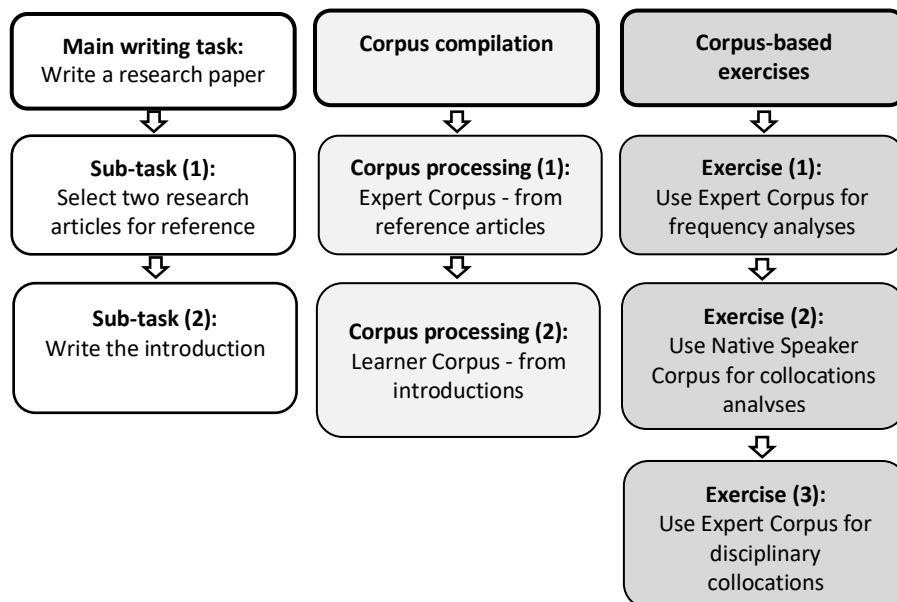


Figure 1. Model of corpus-based intervention in ESP academic writing courses

In a second corpus compilation stage, the introductions and position papers were compiled as the PolSciLRN corpus (Batches 1 and 2) and TourLRN (Batches 1, 2 and 3).

After the corpus compilation tasks were completed, the students were asked to solve the following corpus-based tasks:

1. Students were asked to compare, using LancsBox (Brezina, Timperley & McEnery, 2018), the most frequent words used in their texts to the ones used in the expert corpus. Both the groups concluded that they overused: *the, of, and, that* and *people*. They were then asked to rephrase the parts of

- their introductions as much as possible to use the abovementioned words less. Thus, the participants become familiar with the word-frequency function integral to most concordance programmes.
2. Next, the students were introduced to the British National Corpus and asked to select two words or phrases in their texts which they found problematic. Each student used BNC to discover the collocations containing the selected words. The students were asked to include the collocations in their texts. The students became familiar with the N-gram/collocate function of concordance programmes (Umachandran et al., 2019).
 3. Finally, the students used LancsBox to analyse the expert corpora to discover discipline-specific and academic terms and NGrams. They were asked to include at least one of each in their texts. The students were also introduced to the Whelk function in LancsBox and were encouraged to become familiar with the context of use for their chosen terms/phrases (Coskun, Adiguzel & Catak, 2019).

3.2. Data

3.2.1. Self-compiled corpora

As already mentioned in the method section, the corpus-based intervention model proposed requires the compilation of several corpora, with a lower or higher degree of processing complexity depending on how time-consuming and accessible the data are.

The two categories of corpora used for guided exercises are as follows:

A. Expert corpus – regarded ‘as a model of the sort of academic writing’ to which students should aspire (Scheepers, as cited in Cooper, 2017, p. 134), expert corpora is frequently used to serve as models of comparison for novice/ learner writing. In this study, we decided to compile a web-based corpus for two reasons: texts are accessible and do not require additional processing stages (stages of text format transformation from .pdf or .doc format into corpus format are quick and easy to perform). At the same time, students were involved in the corpus collection stage as a part of the writing task. Each student had to identify two suitable expert texts on the web and contribute to the expert corpus collection. They were made aware of the fact that domain literature is not only useful for content delivery but also a valuable linguistic resource (Surmelioglu & Seferoglu, 2019).

The expert corpora PolSciEXP (Corpus of Expert Texts in Political Science) and TourEXP (Corpus of Experts Texts in Geography) are written in English language corpora based on online existing texts. Variables such as nativeness or high proficiency in English are not controlled, but the inclusion of the papers in reputable journals guarantees a certain linguistic standard. In total, PolSciEXP has 29 texts, amounting to approximately 330.000 tokens. TourEXP is made up of 25 texts, amounting to 155.521 tokens.

B. Learner corpus – generally used for a diagnosis of language learning progress or evaluation of groups of learners (school, university and general language users) – is an instrument that empowers teachers to make informed decisions on language intervention needed in a class. For example, if a corpus of student texts in the first year study programme indicates that there are several collocations repeated and certain syntactic or idiomatic constructions are used incorrectly in more than three occurrences, the decision could be to introduce exercises to raise awareness of phraseological diversity or grammatical accuracy. In this case, the intention was to AW-related linguistic progress whilst introducing corpora. This means that we constructed the learner corpora (PolSciLRN and TourLRN) as a pre- and post-intervention tool, in progressive batches.

This was a more time-consuming task in the previous one since we had to process two and three versions of text, respectively. Thus, PolSciLRN resulted in two batches: one before corpus intervention (Batch 1) and the other (Batch 2) after the students consulted corpora (expert and NS corpus). TourLRN resulted in three batches: Batch 1 (before corpus consultation) and Batches 2 and 3 (after corpus consultation). Since not all students in the course delivered several versions of their text required for

analysis, we selected only those that had all versions: 9 texts from PolSciLRN and 29 texts from TourLRN.

3.2.2. Online questionnaire

After using and analysing corpora for linguistic exercises, at the end of the third session, the students were asked to fill in an online questionnaire in Romanian to measure their perception of the utility of corpus-based techniques used in class. The questionnaire had 38 respondents.

The questionnaire consisted of 10 questions, of which four concerned the profile of the respondents, five were closed matrix questions and one was an open-ended question. The corpus-related questions were as follows: ‘do you know what a corpus is?’, ‘where did you first learn about corpora?’, ‘which of the following types of corpora did you find most useful for academic writing?’, ‘how have the corpus-consultation methods helped you improve your writing (grammar, words, phrases, academic style)?’, ‘in what other way has corpus consultation helped you?’ (open question) and ‘would you like to know more about corpus linguistics and apps based on it?’.

4. Results and discussion

As we wanted to determine the usefulness of using corpus tools and corpus methods for the improvement of students’ texts in ESP courses, the observations are needed to be validated by data and correspondent analyses. For example, the observations of text simplification and vocabulary accuracy had few or no arguments that could support such claims before we performed corpus-based frequency analyses and word list comparisons. The discussion of the most relevant findings is as follows:

4.1. Basic frequencies

By contrasting word lists for PolSciLRN, we noticed a significant decrease in the use of the definite article *the* (by 2.16%), a slight decrease in the use of *that* (by 0.48%) and a decrease of 0.21% in the use of the noun *people*. The conjunction (*and*) and the preposition (*of*) were both utilised more frequently in Batch 2 (by 0.09% and 0.81%, respectively). Whilst not the objects of the corpus exercises, the frequency of the prepositions (*for* and *in*) increased slightly.

For TourLRN, we performed three different frequency analyses, namely, Analysis 1: Batch 1–Batch 2 (18X2 essays), Analysis 2: Batch 2–Batch 3 (18X2 essays) and Analysis 3: Batch 1–Batch 3 (23X2 essays). In Analysis 1, we noticed a significant decrease in the use of *the* (by 1%), a slight decrease in the use of *people*, *of* and *you* (by 0.07%, 0.04% and 0.01%, respectively) and a slight increase in the use of *that* (by 0.1%). The words *travel* and *insurance* were also used slightly more frequently. In Analysis 2, we noticed a slight increase in the use of *the* (by 0.34%) and *of* (by 0.11%) and a slight decrease in the use of *you*, *people* and *that* (by 0.37%, 0.14% and 0.13%, respectively). In Analysis 3, we noted a slight increase in the use of *of* (by 0.13%) and *that* (by 0.04%) and an overall decrease in all other words that the students had identified as subject to overuse in their writing: *the* (by 0.27%), *you* (by 0.52%) and *people* (by 0.03%).

The frequency of the words that were perceived as prone to overuse by the participants in the pedagogical experiment and that were targeted by the first corpus-based exercise changed in an unexpected manner. As the exercise was quite narrow, we expected all five tokens (*the*, *of*, *and*, *that* and *people*) to decrease in the frequency of use, of which only one (*the*) was considerably less used, two were slightly less used (*that*, *people*), whereas two showed a greater tendency towards overuse (*and* and *of*). A close reading of the texts revealed that the tokens whose frequency increased were an integral part of the collocations introduced after the second corpus-based exercise (in the case of *of*) or appeared in the rephrasing, resulting from the integration of the same collocations. On the one hand, the use of the preposition (*of*) as a part of the Genitive case contributed to the improvement of the texts in terms of academic style as this variety of Genitive is more frequently used in academic texts in

English according to Biber and Gray (2011, p. 231). On the other hand, we noticed a syntactic simplification of the texts once unfamiliar phrases were introduced during exercise two and three, which led to the overuse of *and*. This produced the changes in register from formal to less formal.

4.2. N-Gram distribution and collocations in context

Considering the small size of PolSciLRN, it is difficult to gauge the fluctuations in N-Gram frequency between the two batches, the changes in word count being minimal. As such, the most frequent N-Grams are related to rhetorical moves typical of research article introductions: *in this paper, in the present paper, an analysis of, I want to show*. These combinations appear 3–4 times each. However, N-Grams containing the five tokens which were the focus of the previous exercise appeared in the corpus through the introduction of new tokens but disappeared on their own. Table 2 shows the examples for *and, the* and *that*.

Table 2. Deleted and added N-Grams containing *and, the* and *that*

	THE <the EU>	<the IRA>	<the possibility of>	<the Brexit>	<the border between >
Batch 1	#	#	#	#	*
Batch 2	[+]	*	*	[-]	[+]
	AND				
	<and a major>		<and more>	<and point out>	
Batch 1	*		*	*	
Batch 2	[+]		[+]	[+]	
	THAT				
	<that certain stereotypes>	<that prospect>	<that steal>	<that time>	<that job security>
Batch 1	*	*	*	*	#
Batch 2	[+]	[+]	[+]	[+]	*

= frequent token.

* = no token.

[+] = increase in frequency.

[-] = decrease in frequency.

In the case of the token *the*, the changes in N-Gram use are largely positive—it seems that exercise 1 led to error correction in the use of the definite article (e.g., *the EU* and *Brexit*). In the case of *that*, it seems that the token is used frequently as a determiner, a relative pronoun and a conjunction, which makes it difficult to speculate about the causes for its overuse. However, the word lists revealed that the relative pronouns *which* and *who* do not exist in the first batch of the corpus even though the relative clauses are frequent. We can thus assume that students find it easier to use *that* instead of *which* or *who*. This would account partly for why *that* is prone to overuse.

In Table 3, examples from two student introductions can be seen, with N-Gram integration between Batch 1 and Batch 2 highlighted. In the first introduction (<PolSciLRN-001.1>/<PolSciLRN-002.1>), the inclusion of the structures ‘speedily approaching its end’ or ‘such risks as the dissolution of’ represents appropriate corrections. On the other hand, the structure ‘has seen its fair share of celebration of new IRA members’ is ambiguous, repetitive and idiomatic. In the second introduction (<PolSciLRN-001.2>/<PolSciLRN-002.2>), the rephrasing of the sentence below brings about the inclusion of *which* for the first time in our corpus and of stronger collocations (e.g., ‘military interventions’).

Table 3. N-Gram and collocation changes in context for PoISciLRN

<PoISciLRN-001.1>	<PoISciLRN-002.1>
<i>Many people watch as the Brexit situation is beginning its end,[...]</i>	<i>Many people watch as the Brexit situation is speedily approaching its end [...]</i>
<i>The possibility of implementation of a hard border and the risk that the Good Friday agreement will be broken has set [...]</i>	<i>Any implementation possibility of a hard border involves such risks as the dissolution of the Good Friday agreement [...]</i>
<i>The IRA has been seen celebrating the (xxx) of its numbers, and it is a serious concern for the people that are afraid of them.</i>	<i>Dublin, the stronghold of IRA sympathizers, has seen its fair share of celebration of new IRA members, and it is a serious concern for the people that are afraid of them.</i>
<PoISciLRN-001.2>	<PoISciLRN-002.2>
<i>[...] defeat in the Korean war, so the Vietnam war was a challenge for the U.S Army [...]</i>	<i>[...] defeat in the Korean war, which produced pressure for military interventions in Vietnam [...]</i>

For TourLRN, Analysis 1 showed a slight increase in the use of collocates the tourism industry and, first of all (by 0.01%), a slight decrease in the use of collocates *benefits of tourism* and a *travel insurance* (by 0.02% and 0.03%). Analysis 2 revealed an increase in the use of *on the other hand* (by 0.2%) and a decrease in the use of *a lot of* (by 0.05%). Several new collocates appear for the first time in Batch 3 (Table 4) Analysis 3 (see Table 1): The most frequently used collocates differ greatly between Batch 1 and Batch 3, and the most frequently used collocate is the ones discovered during the in-class DDL exercises. Phrases such as *a lot of people* and *a lot of things* disappear in Batch 3. There is a decrease in the use of *in conclusion* (by 0.06%).

Table 4. N-Gram and collocation changes in context for TourLRN

Batch 1	7,515		Batch 3	7,838	
Type	Frequency	%	Type	Frequency	%
a waste of money	7	0.09%	on the other hand	21	0.27%
a lot of people	6	0.08%	in the case of	18	0.23%
travel insurance is a	5	0.07%	in the tourism sector	15	0.19%
in conclusion travel insurance	5	0.07%	on the basis of	12	0.15%
are a lot of	4	0.05%	a waste of money	7	0.09%
conclusion travel insurance is	4	0.05%	travel insurance is a	5	0.06%
for individuals and places	4	0.05%	a lot of money	5	0.06%
individuals and places too	4	0.05%	as a result of	5	0.06%
have a travel insurance	4	0.05%	the other hand tourism	4	0.05%
as a source of	4	0.05%	the basis of what	4	0.05%

On close reading, it appears that the use of register improved overall with the inclusion of collocations discovered through corpus-based exercises 2 and 3 for both the groups of students. Whilst, overall, the changes concern appropriate integration of more specialised lexis and more complex language structures, some idiomatic use and register slips are noticeable as well.

4.3. Questionnaire analysis

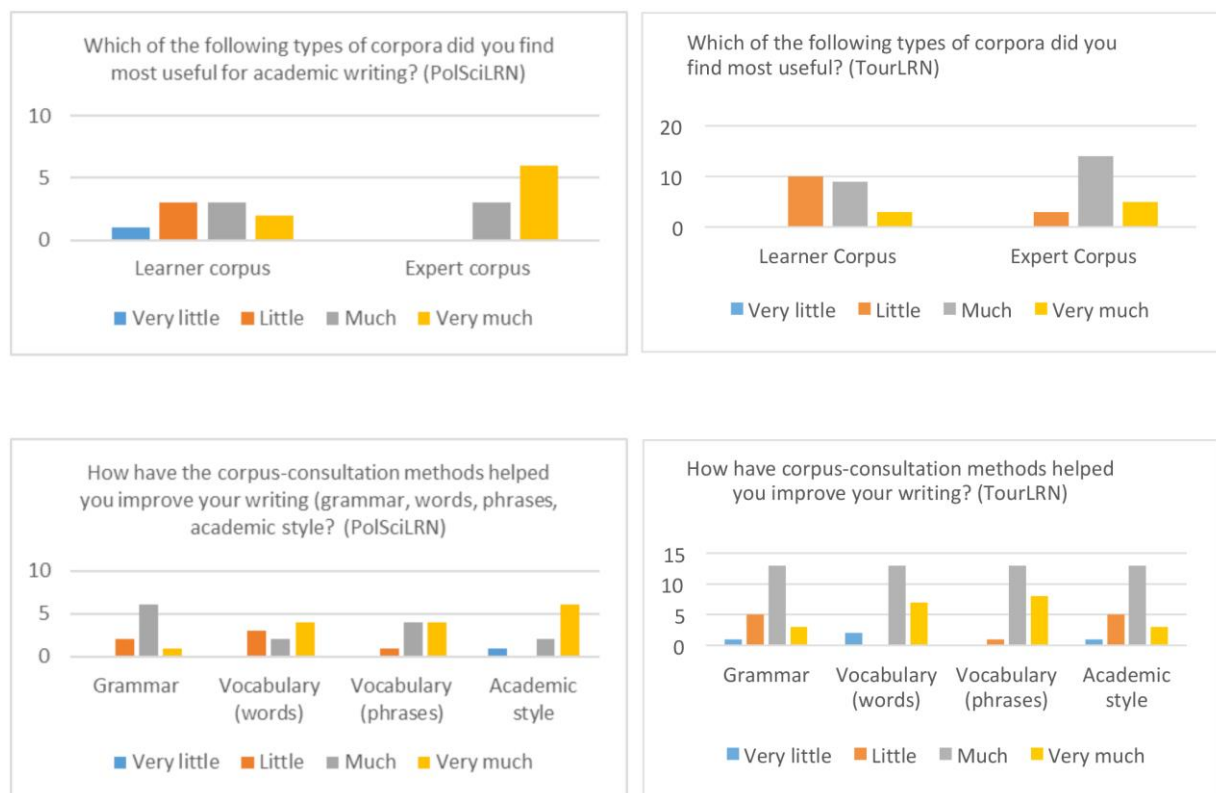


Figure 2. Survey results for PolSciLRN and TourLRN

When answering the questions regarding their perception on the use of corpora in the ESP course, both the groups of students admitted to have been unaware of corpora before our course, and a small number of them were still unsure about the meaning of the term corpus. Figure 2 shows that most of the students perceived the expert corpus as more useful, exhibiting a tendency to be uncritical of authority and a desire for model emulation. Besides, the students perceived corpora as adequate support for all four items mentioned in the survey (grammar, words, phrases and academic style) but saw them as particularly helpful for vocabulary discovery and improvement of academic style. In the open-ended question, the participants remarked on further advantages of corpus-consultation methods: the correction function, the up-to-date language used and the ease of finding sources on the same topic or different perspectives on the same issue.

All in all, the results of the corpus-related questionnaire disseminated amongst students were encouraging: the majority of the students considered the various methods of corpus consultation useful and they unanimously expressed their desire to learn more about corpora.

5. Conclusion

After using corpora, students tend to simplify (i.e., syntactic simplification) their writing style, and their texts were somewhat shorter. They also displayed a higher degree of sophistication in terms of lexical use. The adopted text-changing approaches gravitated towards the use of the conjunction *and*, which increased in frequency, as opposed to more complex cohesive devices. With the exception of the article *the*, the most frequent items remain distributed roughly the same in both versions, with a tendency towards phraseology takeover including most used tokens (*for of* and *that*). Overall, the texts improved in terms of discipline-specific terminology use, academic genre marker use and register, in

general, but attention needs to be paid to idiomatic use. The students evaluate positively the use of corpora for the improvement of their academic writing, which shows that in-class corpus consultation can function as a motivating factor for students.

Regarding discipline specificity, the results show no significant differences between the two groups of students in terms of text quality or student attitude. However, the geography for tourism had somewhat lower language skills, and the results of the survey show that this group found corpora more helpful for assessing grammatical accuracy. We interpreted this to be related to their confidence as English speakers rather than something specific for their discipline.

The pedagogical experiment yielded the promising results which suggest that corpus consultation exercises are effective in teaching discipline-specific terminology, academic genre marker use and register. However, further research is needed to verify these results, using a larger sample size and more versions of student texts to control for changes after each type of exercise.

6. Recommendations

The analysis foregrounded the salient features of corpus consultation methods for improving academic writing in English for Specific Purposes classes. In spite of this, the design of this pedagogical experiment had some limitations. First, the learner corpora was small, so the conclusions might not be generalisable. Second, we often had only two versions of the students' texts, which did not allow for the clear evaluation of each type of exercise. We recommend a replication of this study on a larger scale and separate versions of the texts after each exercise to confirm the conclusions.

Acknowledgements

The study is conducted in the frame of the project ROGER, in progress at the West University of Timisoara, Romania, which is funded by the Swiss National Science Foundation (program PROMYS). The present paper is a part of a larger study investigating the use of DDL in ESP, a part of which was presented at EUROCALL 2019–CALL and Complexity and published as a short paper in the conference proceedings.

References

- Baniceru, C., Borchin, M., Doroholschi, C. I. & Tucan, D. (2012). Academic writing in Romania: a contrastive analysis of BA thesis introductions in Romanian and English. *Quaestiones Romanicae*, 1, 331–345.
- Biber, D. & Gray, B. (2011). The structure of the noun phrase in English: synchronic and diachronic explorations. *English Language and Linguistics*, 15(2), 223–250.
- Borchin, M. & Doroholschi, C. I. (2016). Country report: Romania. In: O. Kruse, M. Chitez, B. Rodriguez, M. Castello (Eds.), *Exploring European writing cultures: country reports on genres, writing practices and languages used in European higher education* (pp. 179–201). Winterthur, Switzerland: ZHAW Zürcher Hochschule für Angewandte Wissenschaften (Working Papers in Applied Linguistics 10).
- Brezina, V., Timperley, M. & McEnery, T. (2018). *#LancsBox v. 4.x* [software]. Retrieved from <http://corpora.lancs.ac.uk/lancsbox>
- Chitez, M. & Bercuci, L. (2019). Data-driven learning in ESP university settings in Romania: multiple corpus consultation approaches for academic writing support. In F. Meunier, J. Van de Vyver, L. Bradley, L. & S. Thouesny (Eds). *CALL and complexity—short papers from EUROCALL2019* (pp. 75–81). Voillans, France: Research-Publishing.Net. doi:10.14705/rpnet.2019.38.9782490057542.
- Chitez, M. (2018). Corpus linguistics meets academic writing: examples of applications in the Romanian EFL context. In: M. Chitez, C. Doroholschi, O. Kruse, O., Ł. Salski & D. Tucan (Eds.), *University writing in Central and Eastern Europe: tradition, transition and innovation* (pp. 133–147). Cham, Switzerland: Springer International Publishing.

- Cooper, T. (2017). Students' use of academic vocabulary in comparison to that of published writers: a corpus-driven analysis. *Stellenbosch Papers in Linguistics*, 47, 133–152.
- Cortes, V. (2018). Corpus tools for writing teachers. In: J. I. Lontas & M. DelliCarpini (Eds.), *The TESOL encyclopedia of English language teaching* (pp. 1–6). Hoboken, NJ: Wiley-Blackwell.
- Coskun, Z., Adiguzel, T. & Catak, G. (2019). Acoustic labyrinth: validation of a game-based heart auscultation educational tool. *World Journal on Educational Technology: Current Issues*, 11(4), 245–256. doi:10.18844/wjet.v11i4.4394
- Eraslan, L. & Kukuoglu, A. (2019). Social relations in virtual world and social media aggression. *World Journal on Educational Technology: Current Issues*, 11(2), 140–149. doi:10.18844/wjet.v11i2.4145
- Gokbulut, B. (2020). The effect of Mentimeter and Kahoot applications on university students' e-learning. *World Journal on Educational Technology: Current Issues*, 12(2), 107–116. doi:10.18844/wjet.v12i2.4814
- Surmelioglu, Y. & Seferoglu, S. (2019). An examination of digital footprint awareness and digital experiences of higher education students. *World Journal on Educational Technology: Current Issues*, 11(1), 48–64. doi:10.18844/wjet.v11i1.4009
- Umachandran, K., Corte, V., Amuthalakshmi, P., James, D., Said, M. M., Sawicka, B., ... Jurcic, I. (2019). Designing learning-skills towards industry 4.0. *World Journal on Educational Technology: Current Issues*, 11(2), 150–161. doi:10.18844/wjet.v11i2.4147