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TESTING CORPUS LINGUISTICS METHODS IN ESP VOCABULARY TEACHING

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Abstract. *Corpus-based methods have been progressively popular and required in teaching language, especially as regards English for Specific Purposes. When it comes to practical application and testing of the e.g. corpus-derived vocabulary lists, the scarcity of the resulting experiences has also been evident. Our idea, therefore, was to conduct experimental research with our target language learners and test the efficiency and effectiveness of corpus linguistics methods by incorporating them in the course design, as opposed to the group of students that continued the semester as per the earlier designed course. The study was conducted with the students of Marine Engineering study programme during one academic semester. Their knowledge of both general and technical vocabulary was tested at the beginning and end of the semester. The conducted and presented statistical analysis was upgraded by semi-structured interviews for providing the students' perceptions and feedback. The results generally point to a positive correlation with innovative teaching methods. Moreover, positive reactions of the students noted during and after the research period bring about the additional and better motivation of both the students and the teachers when it comes to introducing innovative corpus methods in language teaching. In addition, some limitations of the study have been pointed to, as well as recommendations for further and similar research endeavours.*

Key words*: vocabulary, corpus, word list, students, DDL method*

1. INTRODUCTION

We have been witnessing more validation and proactive conduct in applied linguistics research, calling for further research and testing with language learners (Oleskeviciene et al., 2021). By obtaining as specific and as measurable results as possible, as well as feedback and evaluation of applied methods and materials, the general idea is to optimize the teaching and learning process and all their aspects (Đurović and Vuković Stamatović, 2021). In particular, our research aims to explore the application of corpus linguistics methods for the enhancement of vocabulary teaching/learning for a very specific professional area such as marine engineering, which has proved to be extremely demanding vocabulary-wise (Đurović et al., 2021). We also have to bear in mind that this kind of research does

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not provide us with ready-made solutions or finally recommended course design, but with an insight into new possibilities in the language teaching and learning process (Dörnyei, 2011: 16, 17).

The in-classroom research depends on a number of variables and methods to be explored, tested, and measured. Depending on the type of data obtained, we generally come across two research paradigms – quantitative and qualitative research, with a variety of mixed data collection methods such as observation, questionnaires, and various interview structures. The two paradigms have been adding to one another, the advantage of which we are going to use in our research and presentation of results, following the general recommendations and trends for this kind of research (e.g. Cresswell et al., 2003; Dörnyei et al., 2005; Denzin and Lincoln, 2005a). This way, we can use the advantages of both approaches and, at the same time, overcome the limitations of one or the other.

2. PROBLEM STATEMENT

The accelerated production of word lists, ranging from general to more or less specialized ones, seems not to be even closely followed by the abundance of their testing, available results and specific recommendations thereof. One of the reasons might be the fact that vocabulary is not to be taught or learned in isolation, but should be carefully incorporated into course designs. Also, as each word list is created to serve a certain target group of language learners, individual pedagogical implications and recommendations can serve only as a guideline, whilst a course design for a certain group of language learners, especially when it comes to ESP, is to be specifically tailored to address their professional language needs. Bearing in mind all the above as related to our specific teaching and learning setting, as well as contemporary teaching methods promoting student autonomy and digitalization, we decided to test the efficiency of our corpus linguistics methods (with the list produced and the very corpus) in the teaching process and as opposed to some "standard" ones. An issue would be the limited number of target learners, as was in our case, thus limiting our research to a pilot-one, with recommendations for possible extensions.

3. METHODOLOGY

For obtaining the most frequent and most technical vocabulary needed by marine engineers, we collected a series of instruction books and manuals from various types of ships, such as container ship, tanker ship, supplier and cruise ship. The final professional corpus comprised main engine and auxiliary machinery instruction books and manuals totaling 1,769,821 running words (tokens) (Đurović, 2021). The specialized word list was produced by AntWordProfiler 1.4.0w software (Anthony, 2014). In order to deduce the general English vocabulary from our vocabulary frequency count, we used the first 3,000 BNC/COCA[1] words[2] (Nation, 2012).

[1] The referent General English (GE) frequency word lists obtained from the British National Corpus and Corpus of Contemporary American English (BNC/COCA). Each of the 25 lists contain about 1,000 word families each, and, for this kind of research, they are usually accompanied by additional lists of the most frequent proper names, abbreviations, transparent compounds, and marginal words.

In addition to consulting experts in the process, mainly certified Chief Engineers, we were also led by official requirements laid down by the International Maritime Organization, its convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW A-III/1, 2010), and, more specifically, its Model Course for Maritime English (Model Course 3.17 – Maritime English, 2015). Considering that most of the requirements for marine engineers are related to adequate reading comprehension of technical publications, our research focuses on receptive vocabulary knowledge, primarily that of technical vocabulary.

In order to examine the possible application and effects of corpus linguistics methods and tools in teaching English for Marine Engineering Purposes (EMEP), we used an adapted Data-driven learning method (DDL) which anticipates the direct exposure of the students to specific corpus linguistics data, in this case, the most specific and professional genre of the marine engineering discourse community. According to the actual curricula of the target learners and their technical subjects of the previous and the running semester, the corpus was based upon 7 selected instruction books related to marine main engines.

For the progress assessment, we used the Vocabulary Size Test (Nation and Beglar, 2007) in the original available versions A and B, and the same (multichoice) test concept for the technical vocabulary test, which was given to students at the beginning and the end of the semester.

4. Research Setting and Organization

Following the summarized experiences from relevant literature (e.g. Dörnyei and Ushioda, 2011; Sekaran and Bougie, 2016), the strategic framework of our research could be presented as follows:

Table 1 The strategy of the research conducted at the Faculty of Maritime Studies Kotor during the summer semester of 2020

Research Strategy	**Researcher Involvement**	**Research Setting**	**Unit of Analysis**	**Time-frame**
Mixed methods: quantitative and qualitative research	Moderate to high	Partly controlled	1st -year students of Marine Engineering	Academic semester
Data collection	**Involvement**	**Place and format**	**Sample detail**	**Duration of research**
▪ Multiple-choice tests ▪ Semi-structured interview	▪ Material preparation ▪ Preparation of assignments ▪ Consultations ▪ Corrections ▪ Feedback	▪ Classroom (minor share) ▪ Individual work at home (major share) ▪ Online consultations	▪ Experimental group (n=15) ▪ Control group (n=15) ▪ Total (n=30)	▪ 15 weeks ▪ additional weeks for testing and interviews

[2] A "word" here generally refers to a word family as a unit of measurement, taking into account the learning burden, i.e. effort put in learning a word head with its inflected and derivative forms.

As we can see from Table 1, our target ESP learners are the first-year students of the Faculty of Maritime Studies Kotor (University of Montenegro), the study programme of Marine Engineering. The research was conducted during the summer semester 2020, English Language II. As per the latest accreditation from 2017, the study program of Marine Engineering comprises four English courses the first of which is mainly general English, with English for Maritime Purposes (EMP), and, more specifically, English for Marine Engineering Purposes (EMEP) taught through the subsequent three. In aiming for the most numerous group learning ESP, i.e. EMEP, we opted for English Language II, skipping the English language I in order to avoid the interference factor of the beginners. Here we must also note the heterogeneous composition of the students enrolled, since they come from a variety of eligible high schools with various backgrounds and L2 proficiency, some of which have graduated from the maritime high school, already having some experience with the professional setting and technical ESP.

The first several working weeks were organized as per the usual syllabus for all the students, which covered mainly general maritime English. For the rest of the semester (15 working weeks in total), we opted for systematic sampling by dividing them into two groups according to odd and even numbers of their indexes, for the purpose of proportionality. Odd numbers were the experimental group, while the even ones were assigned to the control group. The control group continued as per the "traditional" way of teaching and learning, while the experimental group pursued the adjusted DDL method. Apart from examining the differences in vocabulary acquisition between the two methods – the standard one and the innovative corpus linguistics method, we can say that we also contrasted the two approaches to teaching/learning (technical) lexis, as mentioned in the relevant literature (e.g., Fuentes, 2007: 22). In particular, the control group had textbooks with exercises, as usually used in the English classes, anticipating the bottom–down learning approach, starting from the macrostructure to the target lexical units. Contrary to that, the experimental group started with specific lexical elements, applying the bottom-up approach.

During the research period, the students had a succession of five homework assignments. The first one covered twenty-five technical words from the word list of marine technical manuals (Đurović, 2021) for which the students were required to find five exemplar sentences from at least three instruction books offered, as well as to find and provide their translation. For the continuation, we reduced the burden to three examples and a total of 20 technical terms (including transparent compounds) with one-week deadlines for the submission of assignments. As for the final – fifth assignment, we decided to test another corpus linguistics and teaching method – working with parallel corpora. For this assignment, the students were provided with additional material, two textbooks used for their technical subjects Marine Engines I and Marine Engines II in the Montenegrin language (Pažin, 1998; Nikolić, 2005). For this assignment, they were required to find three examples of the word use in instruction books, and, once translated, also find three examples of their use in the textbooks in Montenegrin. All the materials and detailed assignments with explanations and examples were available on the Moodle platform, which the students had been regularly using throughout the study process at the Faculty of Maritime Studies Kotor. The work of the students was closely monitored and assisted throughout the process.

An additional challenge was brought by the COVID-19 pandemic. Luckily enough, the idea of the research was to encourage individual work of the students, monitored and assisted by the teacher, so the research itself was not significantly affected by the current situation. Also, regular consultations with the students were held through the Zoom platform and the Viber group.

In considering the appropriate number of words to be addressed per each homework, we were led by the available amount of time, the learning burden, and also the previous research results, although unfortunately not too numerous when it comes to the application of words lists in the teaching process. For example, Van Benthuysen (2001) assigned his students 75 words of the University Word List (Xue and Nation, 1984), and tested their knowledge of the form, meaning, and use every two weeks. Dang and Webb (2016), on the other hand, suggested the division of the 800-word list into the sublists of 50 words. Nation (2000, 2016) mentions about 1,000 words easily acquired by native speakers learning their mother tongue, whereas the same vocabulary size is a significantly more difficult task for non-native speakers. According to all the above stated, and with constant consultations and monitoring of the students and their work, we opted for the above methodology and organization of the research.

5. Sample Size, Limitations and Relevance

In terms of the number of participants, few limitations to the research were imposed at the very start. The number of regularly enrolled students in the first-year study of Marine Engineering is 60. In selecting the English course through which to conduct the research, we were led by the number of students (more reliable results), as well as the convenience of the technical part of the curricula. Nevertheless, we were not able to take into account the ideal number of students. Considering the factor or regularity in terms of their attendance, the tests taken at the beginning and the end of the semester, as well as dedication to homework assignments, we had to exclude a significant number from the final count and analysis in order to avoid the nonresponse error. Finally, our convenience sampling ended up with a total of 30 students, 15 students per each of the groups. Considering that the total number of research sample elements meets only the lowest recommended thresholds for this type of research (Dörnyei, 2011; Sekaran and Bougie, 2016), we are referring to it as a small-scale or pilot research. For overcoming this initial limitation, we integrated the qualitative research in the form of a semi-structured interview of 12 experimental-group students. In addition to qualitative results presented through some standard statistical analysis and presentation, this way we sought to obtain students' feedback and perception on the innovative methodology for learning technical vocabulary.

Bearing in mind the relevance component of the research, we were led by the general recommendations of the authors and researchers. When it comes to quantitative research, the sample is recommended to include 30 to 500 research units, while in experimental research conducted in a controlled environment, successful research can be conducted even over the sample of 10 to 20 units (Roscoe, 1975; Dörnyei, 2013; Dörnyei and Ushioda, 2011; Sekaran and Bougie, 2016). If we try to consider the representativeness of our sample for the population of marine engineering students, the relevance would be neglectable, although the sample size in scientific research is acceptable to cover only 0.1% (Dörnyei, 2013: 99). Lead by the pragmatic reasons for organizing this kind of research, we opted for the convenience sampling method (Kemper et al., 2013; Dörnyei, 2013).

Having a very limited sample at hand, we also took careful consideration over the statistical method that could be applied. Based on the experiences and findings summarized by Dörnyei (2013: 99, 100, 231), correlation research requires at least 30 participants, and for comparative and experimental analysis at least 15 per group are needed. As regards multi-variant procedures, about 100 participants are the recommended threshold, which was

the reason not to include it in our quantitative data analysis. Another guiding line set for the application of parametric tests such as Pierson's coefficient is a relatively normal distribution, which was the reason to explore the normality of the obtained results (Figures 1 and 2). There is always a possibility of non-parametric tests. However, we wanted to pursue research that would be of a pilot or illustrative character with the replicable methodology that could be applied in other and possibly wider and more comprehensive studies, which would also be an important research aspect (Sekaran and Bougie, 2016: 353).

6. Quantitative Analysis Results

Based on the testing results achieved at the beginning and end of the research interval, we provided a statistical analysis of the collected data. According to the maximum score, the results are presented on a scale of 0.00 to 100.00. The statistical mass or the sample is the first-year students of Marine Engineering, nominally marked by the statistical units of 1, 2, 3, etc. The numerical data represent the students' test results, the comparison of which tends to provide the relationship between the factors, i.e., between the two teaching/learning methods for the target ESP lexis. Table 2 presents the results of the general vocabulary size test at the beginning and end of the research period (GVTE1, GVTE2), the results of technical vocabulary size tests (TET1, TET2), and the same for the control group (GVTC1, GVTC2, and TVTC1, TVTC2).

Table 2 The results of the experimental and control group achieved on general and technical vocabulary size tests, ranging from 0.00 to 100.00

GVTE1	GVTE2	TVTE1	TVTE2	GVTC1	GVTC2	TVTC1	TVTC2
66.00	70.00	88.00	92.00	44.00	54.00	35.00	60.00
65.00	69.00	45.00	76.00	32.00	32.00	60.00	56.00
65.00	65.50	74.00	81.00	42.00	41.50	33.00	35.00
50.00	66.00	80.00	89.00	41.00	46.00	50.00	63.00
57.50	59.00	32.00	55.00	36.00	38.00	42.00	46.00
30.00	33.00	36.00	49.00	60.00	62.00	60.00	66.00
42.00	54.00	39.00	47.00	61.00	61.00	50.00	60.00
41.00	51.00	41.00	51.00	38.00	69.00	30.00	60.00
46.00	46.00	63.00	75.00	46.00	44.00	70.00	79.00
53.00	61.00	50.00	67.00	30.00	31.00	39.00	42.00
44.00	48.00	30.00	51.00	36.00	37.50	35.00	45.00
44.00	45.00	31.00	45.00	45.00	47.50	35.00	42.00
37.00	24.00	36.00	46.00	34.00	46.00	37.00	49.00
23.00	26.00	25.00	27.00	36.00	51.00	33.00	45.00
21.00	26.50	27.00	33.00	23.00	24.00	14.00	20.00

Each of the tests can here be perceived as an independent variable. The results point to the heterogeneous composition of elements in relation to the variables, i.e. the tests scores. Some basic descriptive statistics for individual variables, including minimal, maximal and mean values, standard deviation, and variance are given in Table 3.

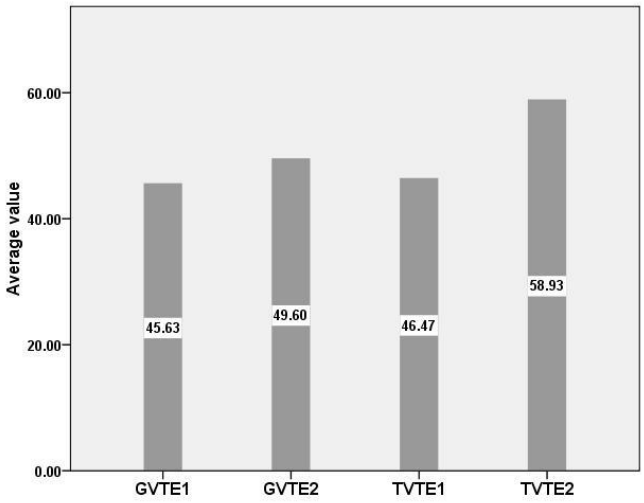
Table 3 The basic statistical indicators for each model variable

Descriptive statistics						
Variable	Students	Minimum	Maximum	Mean	Standard deviation	Variance
GVTE1	15	21.00	66.00	45.6333	14.28594	204.088
GVTE2	15	24.00	70.00	49.6000	16.06260	258.007
TVTE1	15	25.00	88.00	46.4667	20.28323	411.410
TVTE2	15	27.00	92.00	58.9333	19.88347	395.352
GVTC1	15	23.00	61.00	40.2667	10.22229	104.495
GVTC2	15	24.00	69.00	45.6333	12.43478	154.624
TVTC1	15	14.00	70.00	41.5333	14.21200	201.981
TVTC2	15	20.00	79.00	51.2000	14.39345	207.171

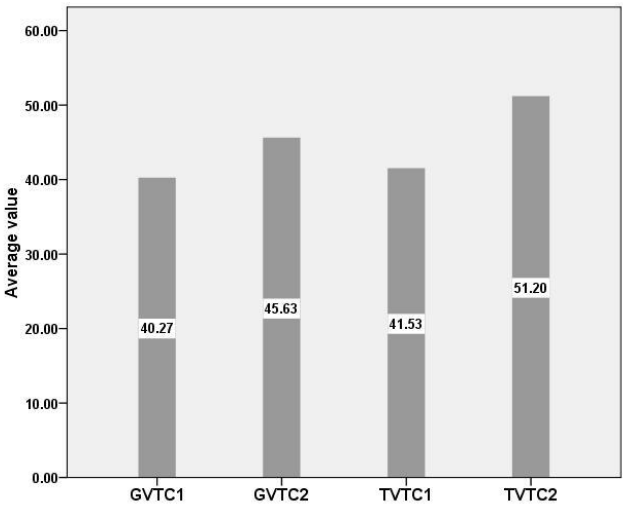
Upon the standard deviation values (Table 3), we can conclude that the biggest difference in scoring was noted on the first technical vocabulary test. Such findings do not come as a surprise, considering the differences in the technical background of the students coming from diverse high schools. We can observe that such diversity is somewhat milder at the end of the semester, which meets one of our goals, also anticipating an initial effort of the students who start to familiarize themselves with this profession not sooner than at their domain studies.

The score means are presented in Graphs 1 and 2.

Based on Graphs 1 and 2, we can easily conclude that the average values of both tests results were better at the end of the semester, i.e. the students have made certain progress both in terms of general English, and ever more effective in technical English vocabulary acquisition. This was also to be expected, considering that a special learning emphasis was put on technical vocabulary, as per the two previously described methods.



Graph 1 Score means of the experimental method



Graph 2 Score means of the control method

We also note a more effective scoring in the case of the experimental group, working upon the DDL method (12.4% to 9.67%). Here we must also mention a significant difference in the preparation process for taking the (technical) vocabulary test at the end of the semester. At the time preceding the tests as our measurement research instruments, the control group students had their second regular progress test of the summer semester and prepared for the final exam. In contrast to the experimental group, students who collected their subject points by doing their homework assignments, the control group students did additional reviews and prepared for the approaching regular test and final exam, including the parts dedicated to lexis. Based on the facts, we can assume that the difference in favour of the experimental group would be even more substantial in case they had an additional motivation such as the preparation for the final exam.

In terms of the results achieved in the successively taken tests, we also need to note a few additional limitations or the "parasite" factors, regardless of the efforts to eliminate them to the best of our abilities. In addition to possible variations in personal motivation and mood of the students, additional motivation and preparations mentioned, we must also mention the factor of practice or maturation (Dörnyei, 2011: 53). According to it, as a rule, the repeated process results in better scores. Although we had a range of about 15 weeks between the first and the second tests were taken, it is possible that some of the students searched for some of the meanings after the first test and memorized them, or just avoided some incidental mistakes from the beginning. In order to reduce this parasite factor to the minimum, we emphasized that the results were not to be graded and that all that was required was a responsible approach to the test, and that the successfulness of the method is measured, and not their personal achievements.

Having in mind that one of the basic goals of pedagogical research is to determine possible relationships between pedagogical phenomena (Mužić, 1977: 490), in the continuation we examined the correlation among the variables, i.e. the tests results. Based on the standard calculations, the differences in values are presented by the correlation coefficient of -1

(maximum or perfectly negative correlation) to +1 (maximum or perfectly positive correlation), where the zero value negates the existence of any correlation among the results. The most commonly applied statistical indicator for the correlation strength, in this case, is the so-called Pearson correlation coefficient[3] (e.g. Mužić, 1997; Dörnyei, 2007; Bauk, 2019, Drašković et al., 2017).

Table 4 presents the correlation results of all the variable pairs in the model, as per the 15-student models of the experimental and control group who took part in coherently different methods of English vocabulary acquisition.

Table 4 Correlation among the variables

Correlation coefficient									
		GVTE1	GVTE2	TVTE1	TVTE2	GVTC1	GVTC2	TVTC1	TVTC2
GVTE1	Pearson corr. coeff.	1	.914**	.661**	.836**	.015	-.150	.267	.187
	Students no.	15	15	15	15	15	15	15	15
GVTE2	Pearson corr. coeff.	.914**	1	.681**	.829**	.080	-.068	.253	.227
	Students no.	15	15	15	15	15	15	15	15
TVTE1	Pearson corr. coeff.	.661**	.681**	1	.925**	.173	.082	.245	.379
	Students no.	15	15	15	15	15	15	15	15
TVTE2	Pearson corr. coeff.	.836**	.829**	.925**	1	.097	-.075	.403	.413
	Students no.	15	15	15	15	15	15	15	15
GVTC1	Pearson corr. coeff.	.015	.080	.173	.097	1	.725**	.543*	.615*
	Students no.	15	15	15	15	15	15	15	15
GVTC2	Pearson corr. coeff.	-.150	-.068	.082	-.075	.725**	1	.190	.585*
	Students no.	15	15	15	15	15	15	15	15
TVTC1	Pearson corr. coeff.	.267	.253	.245	.403	.543*	.190	1	.821**
	Students no.	15	15	15	15	15	15	15	15
TVTC2	Pearson corr. coeff.	.187	.227	.379	.413	.615*	.585*	.821**	1
	Students no.	15	15	15	15	15	15	15	15

** Correlation significance at the level of 0.01
* Correlation significance at the level of 0.05

As presented in the Table 4 legend, the values marked with (**) have the correlation significance at the level of 0.01, which points to high reliability in positive correlation, i.e. the possibility of error is ≤ 1%. For the values marked with (*), the correlation significance is at the level of 0.05%, which is generally an acceptable conventional level of error in social sciences research. This means that in 95 out of 100 cases we can claim that there is a significant correlation between the two variables, or, in this case, the examined tests. A statistically significant correlation ($0{,}50 \leq r \leq 1$) in all the cases analysed here is positive, which would practically mean that the level of progress in vocabulary acquisition, or (more simplified) test scores are similar in relation to all the variables. More precisely, the results obtained by this experimental study showed that there is a strong bivariant correlation among the scores in the following test pairs:

[3] 0.10-0.29 – weak correlation
0.30-0,49 – moderate correlation
0.50-1.00 – strong correlation, where extreme values cannot be reached by any two variables which are not identical

GVTE1 versus GVTE2, TVTE1 and TVTE2;
GVTE2 versus TVTE1 and TVTE2;
GVTC1 versus GVTC2, TVTC1 and TVTC2;
GVTC2 versus TVTC2.

According to the additional analysis, we note that the general vocabulary tests at the beginning of the semester have the highest positive correlation compared with all the other tests by both groups. Bearing in mind the limitations of the research, we can interpret it as a dominant impact of general vocabulary knowledge on the process of acquiring new words, or, in a broader sense, the influence of previously acquired lexical knowledge on the acquisition of new vocabulary.

In addition to basic statistical indicators, we examined the distribution normality of dependent variables, i.e. the deviation ranges of achieved results compared to the expected normal values. For this purpose, we used SPSS (ver. 17.0), i.e. functions of Descriptive Statistics, Explore and Normal Q–Q Plot (Coakes, 2013). The results from examining the normality of achieved test results are presented in Figures 1 and 2. The abscissa values refer to the scores and the ordinate ones to the characteristic values of the Gaussian normal distribution.

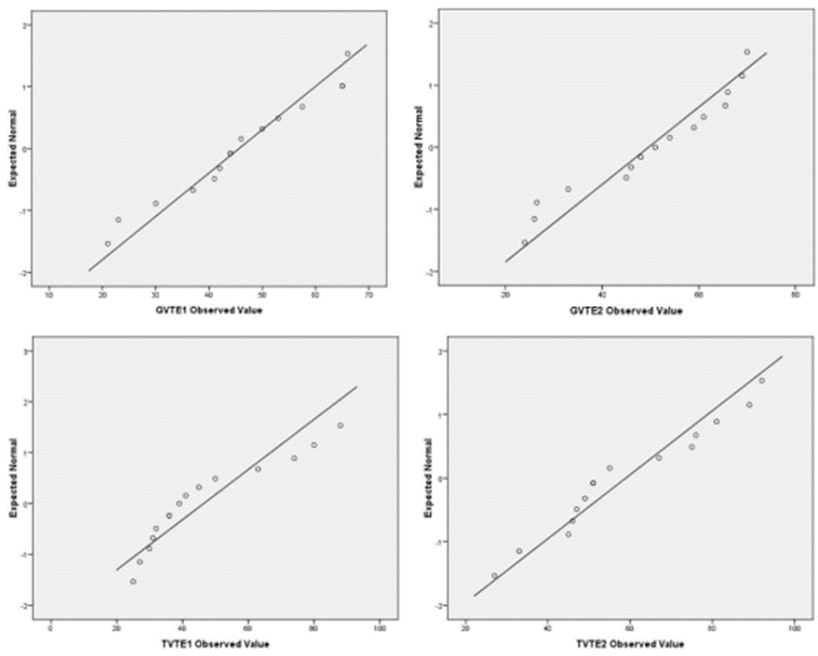


Fig. 1 The assessment of normality of the results in the case of the experimental group

According to the presented Normal Q–Q Plots, we can conclude that there are no significant deviations, especially in terms of GVTE1 and GVTE2. In the cases of TVTE1 and TET2, the deviations are somewhat more distinctive, but without any points to be considered untypical.

Based on the obtained Normal Q–Q Plots, we can also conclude that there are no significant deviations from the normal distribution, except for the two untypical dots in the case of GVTC1 (general vocabulary test at the end of the semester), pointing to the two students achieving significantly poorer results compared to the rest of the students. This part of the analysis was of our special interest due to the heterogeneous composition of the enrolled students, both in terms of their general English and especially technical English skills. Therefore, we were satisfied with the elimination of this deviation on the later tests, which pointed to possibly quick harmonization of the knowledge level in both English vocabulary spheres, certainly with additional efforts put by those with no technical background.

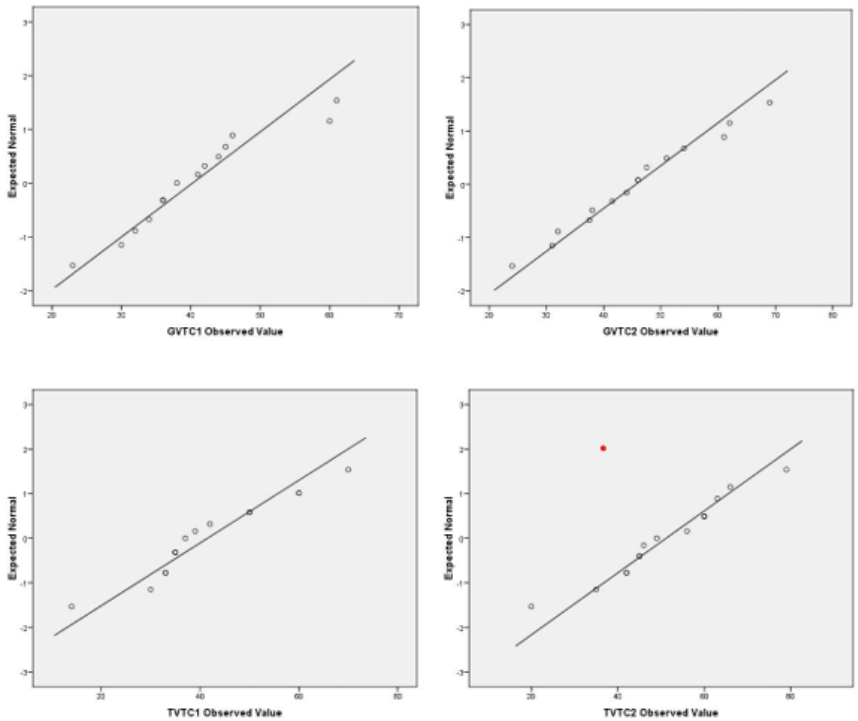


Fig. 2 The assessment of normality of the results in the case of the control group

6.1. Discussion on quantitative research

One of the ideas and advantages of this kind of innovative method is that it encourages individual work, overcoming some limitations and differences in learning strategies applied. We would also like to mention various approaches to doing homework assignments as a consequence of those. Those would include additional motivation, also encouraged by various factors, one of which is the language teaching approach and communication with the students. As mentioned afore, one of the students added pictures of some components related to the assigned words and examples. Other students also had individual approaches to their homework assignments, some of which required additional attention, corrections, and revisions. Generally, the organization and conducting of this way designed research

required great dedication and effort by the teacher in terms of time for homework corrections, review, and regular and timely feedback. That is why this kind of testing of possible corpus linguistics methods is better handled in smaller groups the work of which is monitored intensively and individually, while larger-scale research would require a more demanding organization as regards the number of language teachers and/or experts. At the same time, a more prospective generalization of results could at the same time be to the detriment of intensive and equalized teacher-student interaction.

In order to overcome the generalization issues of the research, we added the qualitative component to the research, conducting a semi-structured interview with experimental group students.

7. QUALITATIVE RESEARCH

This part of the research aimed to obtain the general perception of the participants and our target group, at the same time, in relation to the innovative teaching material and its application through data-driven teaching/learning. By codifying 12 students' responses to the semi-structured interview we received their most positive and negative impressions related to the class organisation during the experimental period, as well as to specific research parts and teaching tools and tests used. Taking into consideration some of the most contemporary recommendations for conducting qualitative research, in order to reach its validity and overcome some main threats, we were led by general recommendations both from theoretical textbooks and specific research papers (e.g. Maxwell, 1992; Holliday, 2004; Gyllstad et al., 2009; Dörnyei, 2011; Barfield, 2012; Jurkovič, 2013). In that, we also came to the conclusion about the advantage of having a researcher that has been teaching the target group, i.e. being "close" in having professional experience with the interviewers. This facilitates the primary principle of this kind of research in relation to the ethical issues (privacy protection), but also a relationship with the interviewees and one's influence on them. This emphasizes the advantage of working with smaller groups, where working with the candidates can be more intensive and reach higher internal validity. The same approach cannot be applied to larger groups or atseveral universities, which, in return, affects the external validity of the research and the generalization of results and conclusions.

For this part of the research, we used one of the most frequently applied and most suitable quantitative methods – semi-structured interviews. The interview questions were developed upon the following variables and categories:

Table 5 Interview variables and categories

Variables	Categories
Student satisfaction	Participation in research during classes The most likable/easiest part of the research The least likable/the most difficult part of the research
Comparative impressions	Time spent Language teacher involvement / individual work
Opinions and suggestions	Method efficiency and additional suggestions Usefulness of the frequency vocabulary list from ship instruction books and manuals Other technical literature Additional suggestions for teaching/learning technical vocabulary

The interviews with 12 students of the experimental group were recorded. Through the process of reduction and coding, we came up with the results as presented in Table 6[4]:

Table 6 Data/information obtained from interviewing experimental group students

Category	Responses (number and %)	Indicative comments
1. General impression of the research – likability	12 students (100%)	”I liked working this way because I go more in-depth and to the essence and learn more than generally anticipated. “
1.1.Most liked / easiest	Tests – 2 students (16,5%), especially the technical vocabulary test at the end Working with instruction books (Homework assignment (HA) No. 2, 3, and 4) – 4 students (33,5%) HA no. 5 – 3 students (25%) Individual and regular work, self-organizing time – 3 students (25%) All great, new and interesting, not too difficult– 2 students (16,5%) Learning specific words – 1 student (8,5%) Nothing in particular – 1 student (8,5%)	“Homework assignments. Because I could do them in my own time and check more than once. “
1.2.Least liked /most difficult	Technical vocabulary test at the beginning – 2 students (16,5%) Translation of technical words – 1 student (8,5%) Homework assignments, looking for words was time-consuming – 1 student (8,5%) HA no.1 First part was the most abundant and most difficult and time-consuming - 4 students (33.5%) HA no. 5 Looking for different examples – 1 student (8,5%) Don't know – 1 student (8,5%)	“I would prepare better for next time, I could have done better “ “Too many unknown technical words in the beginning “
2.Efficiency	(Extremely) Efficient method for learning technical vocabulary – 12 students (100%)	“I think this is the right example of how maritime English should be learned, from instruction books that were given to us in this research, because we are going to deal with the similar onboard. “

[4] Translated from Montenegrin by the authors.

3.Usefulness of the available word list of the most frequent instruction books' technical vocabulary	Yes – 11 students (91,5%) No – 1 student (8,5%)	"I think it would be better without the word list because this way we have to work harder to find some words, and while looking for them, we learn some new. " "...it would be useful to extract the most frequent technical vocabulary. Instruction books are of great importance to us, because without knowing them, it will be more difficult to find a job for us. " "...and during the studies, especially when we go onboard, words with translations to our language... "
4. Availability of additional marine engineering literature	Instruction books (the same) – 4 students (33,5%) Additional diagrams and schemes of marine systems – 4 students (33,5%) More texts describing operation (instr. books are difficult to follow) – 2 students (16.5%) Include a technical journal – 1 student (8,5%) Instruction book in the national language – 1 student (8,5%) A textbook in the beginning, instruction books later on (due to difficulty) – 2 students (16,5%) Bilingual dictionary (possibly illustrated) – 3 students (25%)	"I think it would also be useful to use some diagrams of the systems (fuel supply to the engine, water pump, cooling system…), and then, for example, to translate them, because we would learn the names of the parts and the way it works."
5. Time spent in comparison with „traditional" methods	More time needed – 5 students (41,5%) The same or less – 6 students (50%) Don't know – 1 student (8,5%)	"Certainly, more efficient and interesting, would have been easier if we had had the words translated " "More time was needed...but we learned a lot...it is easier to get ready-made translations and examples from the teacher, but this way we are "forced" to read professional material. "
6. Inclusion of the experimental method in the traditional second language classes	Yes (combined if possible) – 8 students (66,5%) No – 2 students (16,5%) Don't know – 2 students (8,5%)	"It would be easier, but this way we learn more, this way is more efficient" "I think this is better to be done through home assignments because in the classes the students would write it down without thinking, a this way at home we even have the liberty to call a seafarer and learn more translation options." "I think that working with a teacher would help a lot to those who face the Maritime English language for the first time, because the teacher can explain it and present live"

		”It's better to have combined learning,...some in the classes, some on our own....“
7. Suitability of the applied method in learning without a teacher	-Yes (definitely), especially after the graduation – 10 students (83,5%) (words from a dictionary are hard to remember), even better if we have the examples or at least translations (so we don't look for them ourselves) - Don’t know – 1 student (8,5%)	“It's always better with a teacher due to the authority and consultations “ “It keeps a better focus than the classical method “ “Definitely,...because some technical words change their meanings in different contexts. Through the examples, I could understand in which cases.... “It's easier to look for it in the dictionary, but this way is more efficient because we see the exact place where it is mentioned, in which part of the engine “
8. Additional suggestions for teaching/learning technical vocabulary	no (additional suggestions), I wouldn't change anything – 6 students (50%) more HAs as no. 5 – 2 students (16,5%) I hope we will get the word list with translation, at least before we graduate from the Faculty Add instruction books in our language with each assignment (for translations) Less words by the assignment, but more assignments	“I stated them through my answers, and, considering this kind of research, you can always count on me.“ “I don't have any, except more interesting research in classes.“

7.1. Discussion on interview results

Based on the newly generated categories, after the answers were analysed, reduced, and coded, we can tell that they to a certain extent correspond with the preliminary categories of questions. Also, the most numerous categories related to the variable of students’ opinions and suggestions, which was of extreme importance to us and which should always be taken into account with similar experimental research (Rubin and Rubin, 2005: 15).

In the next level of coding, we could point out the positive and negative perceptions of the research, i.e. the implementation of this specific method of data-driven learning. The most positive reactions in this regard would refer to the participation in the research, alternative teaching/learning methods (compared to the traditional ones), the interesting aspect, usefulness, and efficiency of the method. The most negative reactions are related to more demanding and complex home assignments, which required more time. Also, a good deal of negative reactions arose from facing new and demanding approaches, thus the most difficult assignment was considered to be the first and the fifth one. The most difficult part, i.e. the part they liked the least was also the first technical vocabulary test, presumably, especially for the students dealing with the technical maritime engineering vocabulary for the first time.

We also learned about the students' views of the best way to organize the language/ vocabulary classes in the future. The majority (66,5%) was in favour of a combined method, i.e. the combination of the traditional method with textbooks and the DDL method applied, while all of them were pro the inclusion of the corpus method.

The recorded responses also confirm the findings of a series of other research on various learning strategies and overcoming of their limitations (e.g. Laufer and Hulstijn, 2001; Hamzah et al., 2009; Jurkovič 2011; 2013; Baskin et al., 2017). Therefore, the students' autonomy and individual work should especially be accounted for in the teaching/learning process in order to enable them to do at least a part of the assignments by themselves, in their own organization and pace, in accordance with the set deadlines (Stanojević and Janković, 2021). This is also emphasized by one of the five basic objectives for the Engineering Officers language course (IMO Model Course 3.17 Maritime English, 2015: 150) as crucial for developing learning skills for the continuation of self-directed learning "at sea".

What is also obvious is that the students liked the combined teaching materials. They all positively reacted to the inclusion of instruction books into language classes, with the majority voting for combined textbooks and technical materials (75%), whilst three respondents (25%) thoughts that the class should be entirely based on the ship's technical manuals.

As regards the available technical word lists, 91.5% were positive, while one of the students (8.5%) believed that it would be better not to have a hands-on list but to search for the needed vocabulary, as needed. Three of the students (25%) expressed their desire to have a bilingual dictionary of marine engineering. These findings confirm the need for a bilingual glossary or dictionary of marine engineering, in our case, in English and Montenegrin.

In addition to positive reactions to the possible inclusion of DDL method and the technical vocabulary list in regular English courses (83,5%), the same percentage of the students emphasized the efficiency of the method and the vocabulary list that would be available after their graduation and during their professional career.

7.2. Limitations of the study

We have already discussed the sample size issue in terms of the final results taken into account for the statistical analysis. Here we must note some of the limitations generally pertaining to qualitative research in applied linguistics (Dörnyei, 2013: 41). First of all, the responses were not given anonymously, which could affect the objectivity in giving answers and data, in addition to possible subjectivity in data analysis and interpretation, considering the fact that they talked to their teacher who will be further involved in their assessment. This also leads to the so-called Hawthorne effect, causing the interviewees to act differently (less spontaneously and naturally, possibly less sincerely) knowing that they are involved in research and not being anonymous therein.

What proved obvious was their positive reflections on the efficiency of the method, although we believe that their final performance could be much better, especially considering the receptive nature of the required vocabulary skills which had been worked upon in the weeks preceding the final tests. However, the disconcordance between the participant's perception of the improvement in their lexical skills and the achieved results is also not a novelty in this kind of research (e.g. Fuentes and Rokowski, 2002: 12). In our case, one of the reasons for their underachievement (the mean on the final vocabulary test of the experimental group was 51.2 out of 100) was already mentioned and refers to the lack of motivation, since it did not affect their personal grade. What could also be the case is that their perception of efficiency referred to the process of learning vocabulary,

whilst the lack of review and preparation for the test, unlike for the control group, affected their final results. Anyhow, what is extremely important here was their positive reaction towards the method applied which positively influenced their autonomy and self-confidence. The disadvantages and possible improvements are the very reasons for conducting pilot research, which could be addressed for subsequent research, both in the class organization and assessment.

Here we are noting again that our research sought to explore the possibilities of enhancing the technical vocabulary teaching, i.e. the part of classes related to lexis, which does not imply a finally designed language course whatsoever. Our main goal in any of the courses will remain productive language knowledge, including vocabulary skills. This was also pointed out by the students themselves, who asked for the translations, descriptions of certain systems, and similar (Table 6). What we need to bear in mind at all times is that words as meaning carriers are not personalized (Barfield, 2012), i.e. they get their semantic purpose not sooner than in spontaneous or organized communication. Contemporary content-based teaching methods such as DDL are offered as a possible response to overcoming the gap between the scholar and active knowledge, by connecting the development of lexical skills (technical vocabulary) with its contextual application, including testing.

8. Conclusion

The goal of the conducted research was to test the possible application of contemporary corpus linguistics methods through the Data-driven learning method in the process of teaching/learning technical vocabulary. The method applied exposed the students to authentic technical material and provided them with a specifically developed word list from the corpus of selected ship instruction books and manuals. The research confirmed that innovative and intensified communication with students brings about new forms of interaction and useful feedback. The students' perceptions and opinions, along with keeping pace with their professional requirements, as well as contemporary scientific and methodological trends, should be our main guiding line.

The method applied encourages individual work and learner's autonomy, which is of special importance for their future professions, lifelong learning, and professional advancement. This method also helps overcome limitations due to different language learning strategies individually preferred by the students.

Taking into account the limitations of the research, in terms of the number of students involved and duration of one academic semester, the pilot study we conducted shows significant positive effects of the methods applied and their advantages in comparison to traditional (vocabulary) teaching methods. To overcome the limitations of the statistical analysis, we upgraded it with the quantitative part of the research anticipating semi-structured interviews conducted with experimental group students. Based on their feedback collected through the interview, we were able to obtain their perception, comments, and suggestions.

What brought us personal satisfaction and additional motivation from this research are the positive reactions of the students in regard to experimental and innovative teaching methods. The valuable information gathered this way is a valuable encouragement and support to the teachers in their endeavours of introducing authentic materials and modern approaches to language teaching. We also hope that the presented approach and testing of advanced technical vocabulary teaching would serve our fellow ESP teachers in designing their innovative methodologies and possibly develop similar but wider-range research.

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