INTER ALIA

Inter Alia 4
2018

# ESP in Higher Education: Between Terminology, Discourse and Corpus Research


## PROCEEDINGS

### International Conference

### Languages for Specific Purposes: Opportunities and Challenges of Teaching and Research

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**Inter Alia 4**
**ESP in Higher Education: Between Terminology, Discourse and Corpus Research**

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# ESP in Higher Education: Between Terminology, Discourse and Corpus Research

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# Contents

# Editorial

Welcome to the special volume of Inter Alia 2018, *ESP in Higher Education: Between Terminology, Discourse and Corpus Research*, featuring contributions from the first international conference of the Slovene Association of LSP Teachers, to mark its 20th anniversary.

The conference *Languages for Specific Purposes: Opportunities and Challenges of Teaching and Research* in Rimske Toplice from 18 to 20 May 2017 brought together LSP teachers and researchers from 24 countries to share their research and their teaching practices from a variety of international LSP teaching contexts.

This volume of Inter Alia explores the theoretical and practical dimensions of English for Specific Purposes in various professional and academic communities. It particularly focuses on the use of ESP terminology, discourse and corpus research for materials and syllabus design.

In the article *Using Parallel Corpora for Designing ESP Teaching Materials in Higher Education,* Jelena S. Andjelković, Marija T. Novaković, and Gordana D. Jakić from Serbia give an overview of the possibilities of using parallel corpora for designing ESP tasks and tests to improve ESP skills of undergraduate students of the Faculty of Organizational Sciences and encourage their learning independence.

In the article *A Comparative Cultural Analysis of a Terminology: A Project for Law Students*, Anna Yurievna Shirokikh looks upon the existing teaching techniques for studying culture within a language course at the Financial University in Russia and works out a framework for a project-based activity. The author explores how a closer look at subject-specific modes of speech can give way to a boost in cultural awareness, help memorization, and stimulate translation skills, general motivation and students' professional development.

The article by Agnieszka Dzięcioł-Pędich *Documents and Teachers in Designing Tertiary ESP Courses in Poland* presents an analysis of documents that shape the design of tertiary language courses of English for Mathematics in Poland and explores how improvements in formulating language requirements could be made through closer cooperation between content teachers and language teachers to establish how realistic they are, how they affect what language teachers are expected to learn from the field of Mathematics, and whether these requirements are really useful for BA graduates of Mathematics.

In *Teaching Languages for Medical Purposes for International Students*, Alexandra Csongor, Anikó Hambuch, and Timea Németh from Hungary discuss how educators need to recognize the importance of being adequately prepared to work with students originating from different cultural backgrounds and focus on the cultural aspects of language teaching to meet the needs of the new generations. They present the results of the first longitudinal study to identify whether the language of instruction has an effect on language acquisition of the two main groups of students, one learning Hungarian for medical purposes using their mother tongue as the language of instruction and the other using English.

The article *The Survey Research on Terminology Used by the Pharmacists at the Faculties of Pharmacy in*

*Serbia* by Leontina Emanuela Kerničan, Marija Djordjevic and Zorica Antić explores the processes of understanding and acquisition of English pharmaceutical terminology by testing the pharmacists involved in teaching at the faculties of pharmacy to discover the level of acquisition of English technical terms to identify the degree of equivalence and possible mistranslations of the terms into the Serbian language.

In conclusion, I would like to take this opportunity to express our sincere gratitude for the priceless contributions of our reviewers and to everyone involved with the creation of Inter Alia 2018.

And finally, we would like to thank you, our readers, for your continuing interest and support. It is our hope that you find *ESP in Higher Education: Between Terminology, Discourse and Corpus Research* inspiring and beneficial for both your teaching and research.

Mateja Dostal
Editor

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# Using Parallel Corpora for Designing ESP Teaching Materials in Higher Education

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**Abstract**

Language corpora have been used for the design of foreign language teaching materials and tests for several decades, especially in teaching languages for specific purposes. Using parallel corpora offers a number of possibilities in designing LSP teaching materials.

Aiming to create teaching materials for an *English for Specific Purposes* course for BA students of the Faculty of Organizational Sciences, University of Belgrade, a parallel English-Serbian corpus consisting of research articles from the journal *Management* has been designed. Based on this corpus, an overview of possibilities for using parallel corpora for designing ESP tasks and tests has been provided in this paper. The corpus allowed for an extraction of frequent terms, collocations, lexical patterns, and word chunks in the subject field of management. This was later used to design teaching materials and tests intended to improve the ESP skills of undergraduate students. In addition, the paper explores the possibilities of direct interaction between students and the corpus in the process of data-driven learning with the purpose of encouraging students' learning independence.

**Key words:** parallel corpus, specialized corpus, LSP teaching material design, data-driven learning

## 1 Introduction

The word *corpus* is used to describe *"a collection of naturally occurring examples of language which have been collected for linguistic study"* (Hunston, 2002, p. 2). Such text collections are nowadays machine-readable, i.e. they are stored and accessed electronically. Corpora can be used for a variety of purposes, such as comparative and contrastive language studies, translation studies, terminology extraction and analysis, second language teaching and learning, and many others.

There are different types of corpora available, such as general, specialized, written, spoken, comparable, parallel, reference, monitoring, learner's corpora etc.

A general language corpus is a collection of spoken and /or written language data that is (or should be) balanced with regards to genres and domains that it covers. The most well-known general corpora for the English language are the *British national corpus*[1], the *American national corpus*[2], and the *Corpus of Contemporary American English*[3]. The largest general corpora for the Serbian language is the *Contemporary Serbian language corpus*[4] (Serb. *Korpus savremenog srpskog jezika SrpKor2013*) created at the Faculty of Mathematics, University of Belgrade. This written corpus contains approximately 122 million words. It is fairly balanced (it consists of literary texts, research papers, newspaper articles, online news, and some literary and general text translations into the Serbian language), diachronic (time span: 19th century literary text–2011 newspaper articles), morphologically annotated, and available with permission granted by the authors. Another important Serbian corpus is the *Serbian Web Corpus SrWac*[5] (Serb. *Srpski mrežni korpus*), created as a part of the *ReLDI*[6] (*Regional Linguistic Data Initiative*) project containing approximately 555 million words. Even though *SrWac* has exceeded *SrpKor* in size, it is less balanced since all its texts have been collected from the .rs internet domain and therefore cannot be representative of the Serbian language as a whole.

A specialized language corpus, also known as LSP or LAP corpus, on the other hand, is a collection of language samples representing a language for specific purposes. For the most part, specialized corpora are *domain-specific* (thus representing the language used in particular domains, e.g. in the domain of medicine, law, civil engineering, etc.) or *genre-specific* (consists of texts or transcriptions of spoken discourse that belong to a single genre, e.g. research papers, newspaper articles, academic discussions, etc.). In some cases, specialized corpora can be extracted from general language corpora by focusing on a particular domain of language use. The most well-known English language corpus for the domain of business is the *Woverhampton Business English corpus* (Gong, 2005, p. 16), now available with a license through meta-share[7]. Specialized language corpora are not as frequent and as widely exploited as general language corpora and are often made by researchers for a particular purpose, especially in languages of lesser diffusion (cf. Linn, 2006), such as Serbian.

A parallel or aligned corpus is a collection of texts in the source language and its translations into a foreign language. Generally speaking, the development of parallel corpora lags behind the progress made in monolingual corpora, since the compilation and processing of parallel texts is more complicated and usually involves sentence-level or word-level alignment.

1 http://www.natcorp.ox.ac.uk/

2 http://www.anc.org/

3 http://corpus.byu.edu/coca/

4 http://www.korpus.matf.bg.ac.rs/prezentacija/korpus.html

5 http://nlp.ffzg.hr/resources/corpora/srwac/

6 https://reldi.spur.uzh.ch/

7 http://metashare.elda.org/repository/browse/wolverhampton-business-english-corpus/73439812de6811e2b1e400259011f6ea7ba3c52b2b5648cfa1551c8009590db4/

When it comes to parallel corpora available for the Serbian language, two aligned text collections, a French-*Serbian Aligned Corpus* (Serb. *SrpFranKor*) and a *Serbian-English Aligned Corpus* (Serb. *SrpEngKor*) have been created by the Faculty of Mathematics, University of Belgrade and now available through meta-share[8]. In addition, the aligned text collection search tool *Bibliša*[9] contains several aligned text collections in Serbian and English (Stanković et al., 2012, p. 1710). Each collection is at the same time an aligned and a specialized corpus and is both genre-specific (all the texts are aligned research papers) and domain-specific (each collection represents a single domain: librarianship, geology, architecture, dentistry, management, etc.).

So far, corpora have been applied in comparative and contrastive language studies, lexicographical, terminology, translation studies, studies of grammar, sociolinguistics, pragmatics, semantics, discourse analysis and, most recently, in the field of second-language teaching and learning. In addition, each of the abovementioned types of corpora seems to be more suitable for a particular purpose, i.e. for the empirical research the researcher intends to conduct. Thus, parallel corpora are most frequently used in translation studies (for the extraction of concordance sentence pairs for translation) and for comparative and contrastive language studies, while specialized corpora found its most important application in terminology studies (for terminology research and the extraction of term equivalents in another language). In addition, corpora that are both specialized and aligned are very frequently used for automatic or semi-automatic terminology extraction and compilation of term bases and other terminographic products.

The following paragraphs will deal with a relatively new application of corpora, especially of specialized parallel corpora in LSP teaching and learning and, more precisely, in LSP teaching material design.

## 2 Use of corpora in LSP teaching and learning

While discussing the use of corpora in language teaching and learning in general, Römer (2011) mentions both its direct and indirect applications. According to Römer (2011), researchers and material writers can use language corpora *indirectly* by inserting corpora findings in their teaching syllabi design, reference works (e.g. vocabularies and grammars) and teaching materials. When designing syllabi and teaching materials based on corpora, authors generally rely on frequency list information for the creation of "lexical syllabi" (McEnery, Xiao, 2010). Perhaps even more important than the direct use of language corpora is that it can be used *directly* by both learners and teachers in the process of *data-driven learning* (*DDL*), which allows for direct interaction between the teacher and the corpus on the one hand, and the learner and the corpus, on the other hand. However, possible obstacles to the active (direct) use of corpora by language students are, according to Aston (1996), the lack of adequate training and a relatively high level of language proficiency that is required for independent use of corpora for language learning.

In recent years, corpus-based studies have recently become the core areas of LSP research. LSP and professional communication have benefited from both direct and indirect applications of specialized corpora. For LSP teachers and learners, the most obvious advantage of the use of specialized corpora is that they provide authentic examples of specialized language, which are, in turn, beneficial in developing reading and writing skills and in understanding and producing particular texts and types of texts (Aston, 2001; Flowerdew, 2001; Connor & Upton, 2004; Römer, 2011). Ball (2001) reports on the benefits of using corpora in ESP testing, i.e. in compilation and standardization of language tests,

8 http://metashare.elda.org/repository/browse/french-serbian-aligned-corpus/29a1e8168bdf11e28ea3001517144592d79e355941ff4503b26966fc958a94f7/

9 http://jerteh.rs/biblisha/

and illustrates this by saying that the BEC Preliminary Test is based on view by wordlists extracted from *Cambridge Business English Texts Corpus*.

Several studies have also reported the effectiveness of using corpora for creating LSP teaching materials (indirect application of corpora in LSP teaching and learning), especially those aimed at teaching and learning collocations (Howarth, 1998), lexical acquisition (Cobb, 1999), writing and grammar (Tribble, 2001). Before the use of tailor-made specialized corpora for teaching material design, it seems that LSP teachers used to rely heavily on their own intuition and/or written discourse, which did not always seem to result in pragmatically and socio-linguistically appropriate teaching materials.

Unlike monolingual corpora, the use of parallel corpora in language teaching and learning and the creation of teaching materials seems to be still in its infancy. For Danielsson and Mahlberg (2003), the main reason why a parallel corpus can be used in language teaching and learning is managing problems that occur in students' writing due to the interference of their native language. In data-driven learning (DDL), students are encouraged to make use of parallel corpora on their own, in order to discover how words, idioms, phrases, and grammatical phenomena are used in the target language, while teachers only act as facilitators in the learning process by indicating regularities in the parallel texts and thus making learners aware of grammatical, lexical, or discourse features (Granger, 1998). In addition, parallel texts can be used by learners to find potential equivalent expressions in the given languages and investigate semantic, syntactic and collocational differences. Such investigations can lead to comparative language studies (Johansson, 2007).

## 3 ESP corpus compilation and use: our case

### 3.1 ESP teaching and learning at the Faculty of Organizational Sciences

At the Faculty of Organizational Sciences, University of Belgrade, *English for Specific Purposes* is taught as part of both undergraduate and graduate studies. There are two mandatory, two-semester courses in the first and the second year (ESP1 and ESP 2), and an elective one-semester course (ESP 3) in the fourth year of undergraduate studies, as well as an elective graduate course (ESP 4).

As teachers of ESP courses at Organizational Sciences, University of Belgrade, we face large, mixed-ability classes consisting of students with varied majors (Management, Quality Management and Standardization, Operations Management, and Information Systems and Technologies) attending the same course. There is no option to group the students according to their foreknowledge, nor according to their major. In theory, all students should have B2 English language skills in order to select an ESP1 course, but, in practice, since there are no possibilities for organizing placement testing, our students' English language skills differ significantly.

Since there are neither ready-made course books nor teaching materials suitable for our heterogeneous classes, we have to create our own teaching materials that could respond to the needs of our students. So far, we have relied on our intuition and other courses' syllabi and materials in the process of selecting and creating our own teaching materials. We have also used authentic texts in their adapted or original form. These methods are, for the most part, time-consuming (especially the selection and adaptation of authentic materials) and often do not bring satisfactory results.

Inspired by research papers proving the increasing use of specialized and parallel corpora in LSP teaching, learning, and material design, we have decided to investigate the potential of a parallel specialized corpus in the creation of materials for teaching and learning ESP at the Faculty of Organizational Sciences. Starting from the assumption that a parallel corpus would be useful for vocabulary acquisition and writing exercises on the one hand, and for comparative and translation

exercises on the other, we conducted an analysis based on a domain- and genre- specific parallel corpus that had initially been compiled for the purpose of terminology analysis and extraction as a part of a PhD study.

### 3.2 General information on parallel corpus of management

The Serbian-English parallel corpus of management consists of research articles taken from the journal *Management,* published by the Faculty of Organizational Sciences in both Serbian and English (Serbian texts and their English translations) between 2009 and 2012. The corpus consists of 17 issues in each language, with the total of 362 documents / texts (181 per language). The Serbian part of the corpus contains 668,681 tokens and 29,326 sentences. The management corpus is both domain-specific (all the texts belong to the domain of management) and genre-specific (all the texts are research articles), i.e. it is designed to represent a sub-language of general Serbian and English as used in the subject-field of management.

#### *3.2.1 Corpus compilation and processing*

The creation of the management corpus was a demanding and time-consuming task that was performed in a sequence of steps:

**a) Text selection**

The main criteria for the selection of texts to be included in the management corpus were their *representativeness* and *availability*.

First, all the chosen texts belong to the research paper genre and represent empirical studies conducted in the domain of management. Therefore, we believe that the corpus is highly representative of both research paper genre and the specialized academic language used in the domain of management. In addition, research papers represent advanced writings and a complex type of discourse that exemplify an advanced level of difficulty and therefore can be a useful corpus for the design of management-specific language teaching materials, especially those aimed at vocabulary acquisition and writing.

All the *Management* research articles that were included in the corpus are publicly available in *.pdf* format on the journal's website[10]. The availability of journal articles online significantly simplified the process of text pre-processing.

**b) Text processing**

Each text was downloaded in its original *.pdf* format, converted into *.txt* format, and cleaned up of material irrelevant for our linguistic study (e.g. references, tables, graphs, tables of contents, figures, headers and footers, page numbers, reference numbers, image captions, etc.).

After the initial preparation of individual texts, Serbian-English pairs of texts (e.g. issue 60, no.1 in Serbian and issue 60, no.1 in English) had to be aligned on the paragraph level so that comparative and contrastive studies can be performed. A number of problems were encountered during this time-consuming process: such as the differences in layout of two parallel texts, missing or misplaced sentences, or sentences that had not been translated or had been inadequately translated. When the alignment process was complete, it needed to be verified so that there is a minimum amount of noise during corpus analysis.

10 http://management.fon.bg.ac.rs/index.php/mng/about

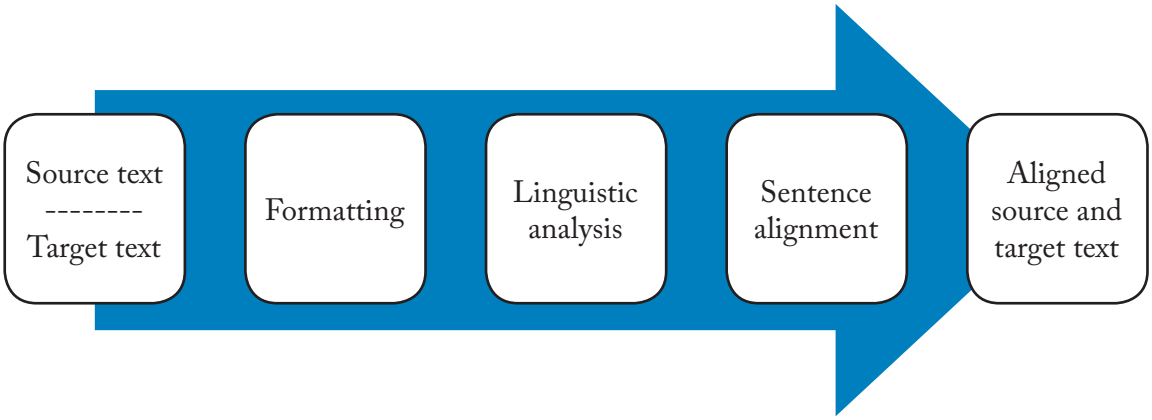


Figure 1: *Stages of parallel corpus processing*

Parallel corpus prepared in this way was ready to be analyzed by using freely available software tools and concordancers such as *AntConc* and *AntPConc*[11]. An advantage of such tools is that they can easily generate wordlists and key word lists, n-grams and clusters, extract collocates, etc. for any given language, but a possible drawback is that they are not ideal for the analysis of highly flective languages such as Serbian, since working with Serbian in these tools requires a lot of manual "cleaning".

For this reason, the Serbian part of the corpus was further processed. This process included character encoding, tokenizaton, morphological analysis, PoS tagging, determination of sentence boundaries etc. performed by members of *JerTeh - Serbian Society for Language Resources and Technologies*[12]. The prepared parallel management corpus was incorporated into *Bibliša*[13], an aligned text collection tool developed by this society, and is now available online, together with eight other domain-specific aligned collections.

### 3.3 Parallel Management corpus and ESP teaching and learning at Faculty of Organizational Sciences, University of Belgrade

The parallel management corpus, though initially created for the purpose of terminology extraction and analysis, proved to be a valuable addition to the teaching and learning process and materials design at ESP courses at the Faculty of Organizational Sciences, especially for ESP 1 course taught as part of Year One of undergraduate studies to students with lower English language proficiency level. Several ways of using this corpus both directly and indirectly, some of which were tested during our classes, will be presented below.

#### *3.3.1 Core vocabulary and teaching materials design*

One of the most important applications of corpora in ESP teaching is the extraction of words and word chunks that constitute core linguistic material for our ESP setting because of their recurrent use in the corpus. We believe that such a semi-technical list of subject-matter words represents the core of specialized vocabulary that our students need to acquire at lower proficiency levels, i.e. during the ESP1 course at the Faculty of Organizational Sciences, and therefore greatly influences syllabus and teaching material design for this course.

11 Created by Laurence Anthony and downloadable from http://www.laurenceanthony.net/software.html

12 http://jerteh.rs/

13 http://jerteh.rs/biblisha/

To provide the core vocabulary list, we generated a general word list initially consisting of 19,643 word types by using the untagged version of the English part of the management corpus and the *AntConc* software tool. The initial list was reduced to 19,492 word types by eliminating some Serbian words and the noise resulting from the imperfect conversion of documents from *.pdf* into *.txt* format. Fifty most common words in the English sub-corpus are presented in Table 1.

Table 1: *English sub-corpus: 50 word types with highest frequency*

| rank | frequency | word type |
|---|---|---|
| 1 | 60356 | the |
| 2 | 33735 | of |
| 3 | 22332 | and |
| 4 | 18177 | in |
| 5 | 15924 | to |
| 6 | 12378 | a |
| 7 | 11360 | is |
| 8 | 7659 | that |
| 9 | 6405 | for |
| 10 | 5992 | as |
| 11 | 5700 | are |
| 12 | 5006 | be |
| 13 | 4958 | on |
| 14 | 3911 | it |
| 15 | 3577 | with |
| 16 | 3407 | this |
| 17 | 3276 | by |
| 18 | 2942 | management |
| 19 | 2880 | an |
| 20 | 2869 | which |

As expected, words with the highest frequencies belong to the group of function words, i.e. articles, prepositions, auxiliary words, pronouns, etc., whereas the only content word is the key word of the subject-field in question – the term *management* itself. As the frequencies drop, however, the number of content words, and especially the number of key terms, increases.

Our focus, however, was not on the general word list, but rather on the list of most frequent nouns found in the corpus. To generate this list, we expanded and reviewed the initial list of frequent words to include only the most frequent nouns, which proved to be either semi-technical words, i.e. the ones used in more than one subject-field (*system, project, development, information, and organization)*,[14] or words of general language *(company, business* and *market)* or technical terms *(management)*.

The ten most frequent nouns in the English part of the management corpus are shown in Table 2.

14 By exploring the presence and the frequency of these words in the 9 text collections for various domains (e.g. geology, architecture, library and information technologies, etc.) available in *Bibliša*, it was proven that they appear relatively frequently in at least 3 of the text collections, and therefore can be considered semi-technical.

Table 2: *English sub-corpus: 10 nouns with highest frequency*

| rank | frequency | word type |
|---|---|---|
| 1 | 2942 | *management* |
| 2 | 2720 | *project* |
| 3 | 2139 | *company* |
| 4 | 2076 | *business* |
| 5 | 1831 | *system* |
| 6 | 1827 | *process* |
| 7 | 1674 | *development* |
| 8 | 1583 | *information* |
| 9 | 1532 | *organization* |
| 10 | 1505 | *market* |

Starting from the hypothesis that new specialized vocabulary is acquired better when taught in chunks or word clusters, we used the *AntConc Cluster / N- gram tool* to generate lists of the most common word clusters around the ten most frequent nouns related to the term *management* so that we can use the list for creating our teaching materials. We believe that word clusters, compounds, and phrases, and especially technical collocations in nominal compounds, are of extreme importance in scientific and technical language. Words acquire fixed positions in compounds and phrases, and thus form characteristic language bonds. In other words, the most frequent nouns, together with their most frequent collocations, compounds, and phrases, represent the core vocabulary that students need to acquire during their ESP1 course.

To illustrate, 30 most frequent *business*[15] word chunks that appear in at least three of the research papers of the *Management* journal (range) are presented in Table 3.

Table 3: *Business word chunks*

| No. | *Business* - clusters | frequency | range |
|---|---|---|---|
| 1 | business operations | 129 | 51 |
| 2 | electronic business | 129 | 10 |
| 3 | business processes | 74 | 25 |
| 4 | business environment | 63 | 35 |
| 5 | do business | 37 | 26 |
| 6 | business strategy | 35 | 15 |
| 7 | business activities | 34 | 24 |
| 8 | business intelligence | 32 | 4 |
| 9 | business decisions | 31 | 12 |
| 10 | e-business | 30 | 8 |
| 11 | responsible business | 30 | 5 |
| 12 | business units | 28 | 11 |
| 13 | business partners | 20 | 13 |
| 14 | business performance | 20 | 15 |

15 It is interesting to note that the plural form of the word *business*, i.e. *businesses*, appears only 84 times in the entire corpus, and that it rarely appears in recognizable word chunks, as it cannot be found in the table above. The most commonly found clusters are nominal phrases (e.g. *business operations, electronic business*), while the only verb-noun collocation with high frequency in the corpus is *to do business*.

| No. | *Business* - clusters | frequency | range |
|---|---|---|---|
| 15 | business success | 17 | 12 |
| 16 | strategic business | 17 | 5 |
| 17 | business results | 16 | 13 |
| 18 | of business doing | 16 | 11 |
| 19 | business development | 14 | 7 |
| 20 | business model | 14 | 8 |
| 21 | banking business | 14 | 5 |
| 22 | strategic business units | 12 | 4 |
| 23 | business and management | 11 | 5 |
| 24 | business decision making | 10 | 7 |
| 25 | efficient business | 8 | 7 |
| 26 | global business | 8 | 8 |
| 27 | company business | 7 | 4 |
| 28 | does business | 6 | 6 |
| 29 | retail business | 5 | 3 |
| 30 | do business with | 4 | 4 |

Each word cluster can also be observed in the context by using *AntConc* concordance tool.

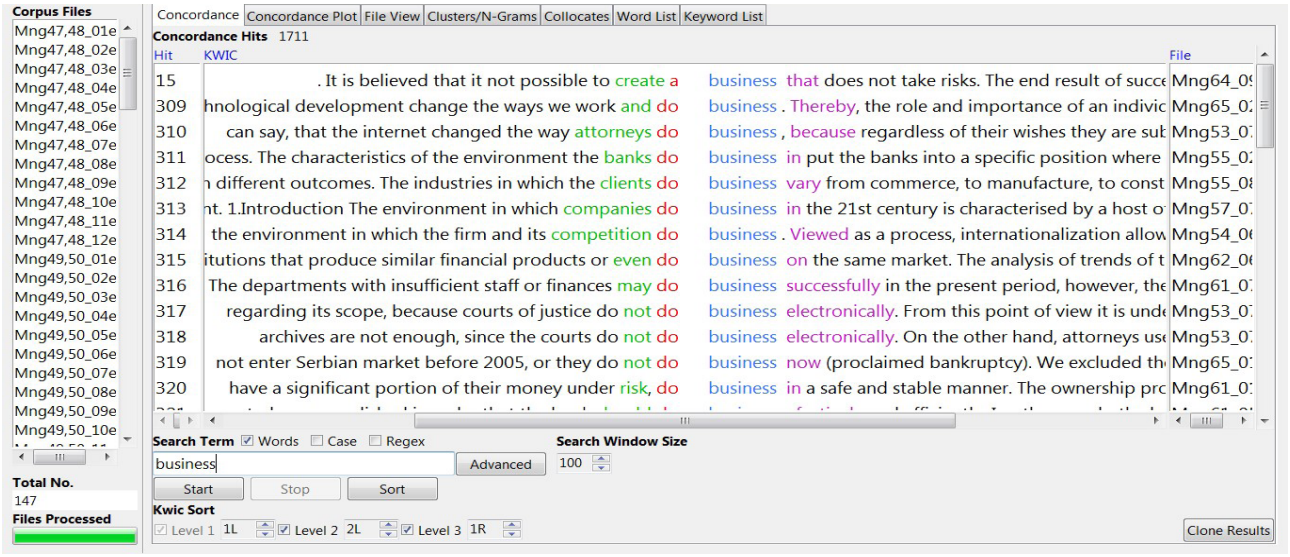


Figure 2: Printscreen of AntConc 3.4.4w concordance tool interface

### *3.3.2 Parallel concordances and translation practice*

Since our students sometimes struggle to find an adequate translation of English lexical word chunks, especially the ones that consist of more than two noun elements (e.g. *strategic business unit, business decision making*), the Serbian sub-corpus of the parallel management corpus proved to be an invaluable source of translation equivalents. The *Bibliša* concordance tool enables teachers to create translation-based teaching materials, while students can be trained to use it for translation practice or when searching for translation of the most frequent clusters.

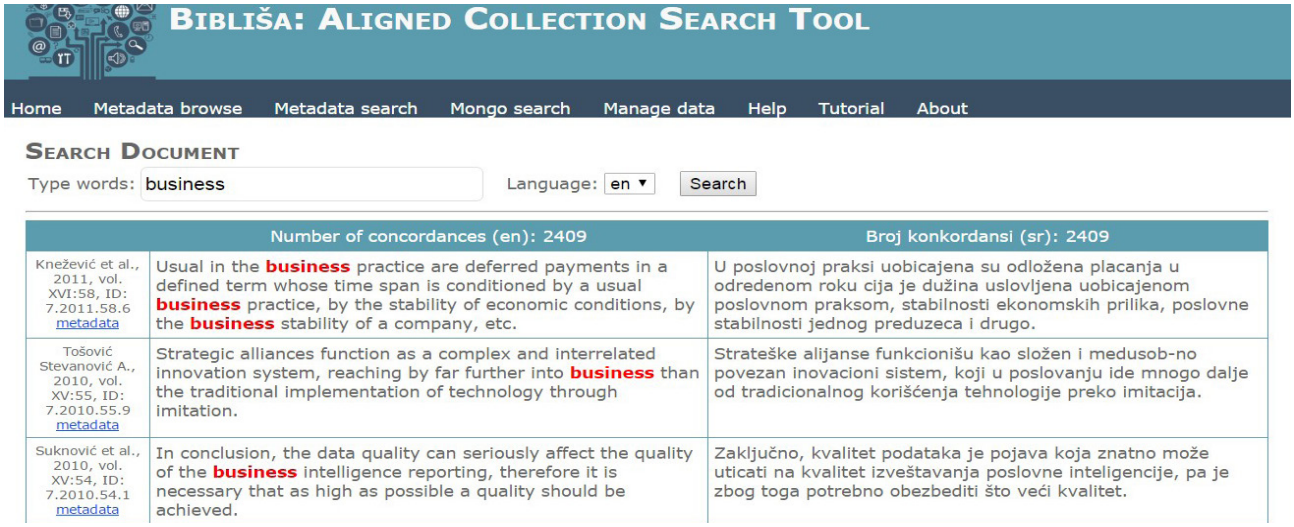


Figure 3: *Printscreen of Bibliša parallel concordance search tool interface*

### *3.3.3 Direct and indirect application of parallel corpus in ESP courses at the Faculty of Organizational Sciences*

The findings presented above can be implemented both indirectly and directly throughout our ESP 1 course. Indirectly, a core vocabulary list and parallel concordances are useful additions to designing "lexical" syllabi (McEnery, Xiao, 2010) and teaching materials whose main purpose is the acquisition of the core vocabulary for the subject-field / domain in question and developing translation competence. These targeted teaching materials can include, for example, gap-filling and cloze exercises for students to explore specific vocabulary, key phrases, and specialized language word chunks (patterns), reading texts, writing and translation tasks that revolve around the targeted core vocabulary, test design, etc. For students with higher levels of language proficiency, corpus-based teaching material does not have to be focused only on core vocabulary, but rather on other discursive patterns, meta-linguistic markers, or on the analysis of common mistakes found in the corpus (having that the texts in the corpus were originally written in Serbian and then translated into English).

For direct application of our corpus in the ESP learning process (i.e. in data-driven learning), we believe that students need to be trained in using both *AntConc* and *Bibliša* tools for corpus exploitation. Students can be encouraged to use the *AntConc* word list and concordance tool to generate their own lists of words, collocations, and word chunks to independently look for authentic examples of their use in the context, as well as to disambiguate the meaning of two similar terms, words, or partial synonyms by observing them in context. This type of exercise seems to be more suitable for students with higher levels of language proficiency. By using *Bibliša*, students can look for translation equivalents, make their own glossaries, look for contextual examples, or use concordance pairs as a point of reference when practicing translation.

## 4 Discussion

The focus of this paper was on potential ways of exploiting a parallel, specialized, genre-specific Serbian-English corpus in teaching material design for ESP courses at the Faculty of Organizational Sciences, University of Belgrade. After presenting the potential and documented benefits of using corpora (in particular specialized and parallel corpora) in the teaching and learning of both general

language and language for specific purposes, the paper focuses on the process of management corpus compilation and processing. The central part of the paper is dedicated to its application in the ESP teaching and learning process, and especially in ESP teaching material design.

After pilot testing the possibilities of using the corpus in the ESP teaching and learning process both directly and indirectly, we have drawn several conclusions.

First, the application of parallel corpora can be considered beneficial to both teachers and students of ESP in higher education. As this is a relatively new medium, it may contribute significantly to teaching and learning diversification and thus improve students' motivation for ESP learning. In DDL, for example, corpora use greatly contributes to the development of students' independence by encouraging them to independently acquire terms, term phrases, collocations, grammatical patterns, and other structures characteristic of specialized discourse. In addition, they can compile their own word and term lists with equivalents in another language and learn to rely on context when seeking an adequate word and word chunk translations. Indirectly, corpus frequency wordlists enable teaching material writers to decide on the core vocabulary to build their teaching materials, tests, and syllabi, especially for courses aimed at students with a lower level of ESP competence.

However, despite all the benefits of both direct and indirect parallel corpora applications, we believe that our ESP teaching and learning cannot be based exclusively on corpora exploitation but should rather be an addition to the traditional approach. The reason for this lies in the limitations and drawbacks of both the corpus itself, and the drawbacks of corpora application in ESP teaching and learning in general.

One of the limitations of the corpus is its representativeness and balance. Namely, given that this corpus is genre-specific (all the texts are research papers) and domain-specific (all the texts belong to a single domain of management), we cannot regard it as a fully balanced and full representation of the subject-field of management as a whole. Therefore, we believe that it should be further expanded to include other text types and genres, i.e. conference papers, introductory textbooks, technical reports, online discussions, and similar. This view is supported by Conrad's (1996, p. 302) claim that "different genres must be coped with by learners in order for them to widen their knowledge and enhance their linguistic competence."

Another drawback of parallel corpus use is related to our class size and the training of students. We believe that using a parallel corpus in the ESP teaching and learning process is much more effective with small classes, since this enables the teacher to truly observe and facilitate students' corpus work. Large classes make it difficult to monitor students' corpus work and progress, and to train them how to properly exploit the corpus.

To conclude, we believe that our Serbian-English parallel corpus on management represents an invaluable source for indirect use in our ESP classes, since it can enable designing teaching materials and other resources based on frequency wordlist, frequencies of phrases, collocations and grammar patterns found in the corpus. The main obstacle to its direct application in our ESP courses seems to be prompted by the size of our classes, since large, mixed-ability classes make the corpus use training and corpus exploitation by the students themselves significantly more difficult.

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# A Comparative Cultural Analysis of Terminology: A Project for Law Students

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**Abstract**

Culture is implicit in language studies. Cultural competence can be enhanced not merely by providing students with information, but also by investigating the nature of words and speech patterns, and research into etymology and comparisons with the mother tongue. ESP studies tend to become more international due to unification of professional terminology. The hypothesis is that a closer exploration of subject-specific modes of speech gives way to a boost in cultural awareness, helps memory, stimulates translation skills, general motivation and students' professional development. The paper presents an overview of methodological approaches to cultural studies in ESP and describes a project into cultural awareness for Bachelor-students of Law at the Financial University under the Government of the RF. The language output of the project, i.e. peculiarities of legal English, identified by students during the project, and the didactic impact which the project has had on students' cultural awareness are described and interpreted.

***Keywords***: cultural competence, language for specific purposes, project-based learning, terminology, etymology, semantic analysis

## 1 Introduction

According to White (1959), to some, culture is learned behaviour, to others, it is not behaviour at all, but an abstraction from behaviour (p. 227). He stated that any things, acts and events are dependent upon 'symbolling'. When they are considered and interpreted in an extra somatic context, i.e. in terms of their relationships to one another rather than to human organisms, we may call them culture (White, 1959, p. 231). Language and culture have one common feature – both are symbolic in nature. Language is a universal semiotic system, all symbols are denoted by words. Hoffer (2002) found that cultural issues in teaching languages represent a field of sociolinguistics that can mean a descriptive study or it can seek to solve linguistic problems of social behaviour (p. 5).

Cultural component introduced by language teachers is thought by Frank (2013) to be 'surface culture' being presented by ideas about food, national costumes, traditional music and dance, literature, specific holidays and sub-surface culture, which includes notions of courtesy, body language, gestures, touching, eye contact, personal space, facial expressions, conversational patterns, and the concept of time (p. 3). Consequently, there are two approaches to teaching culture within a language, one being the transmission of factual, cultural information (Thanasoulas, 2001, p. 3), the other approach is seen as embedding culture within an interpretive framework and establishing connections, namely, points of reference or departure, between one's own and the target country (Thanasoulas, 2001, p. 4).

## 2 Literature Review

The cultural component of language studies has always been in the spotlight. Thus, Thanasoulas (2001) leads to the conclusion that high culture – art, literature, music are external expressions of culture and are easily taught to students by just including the issues in the curriculum. He states that the most important part of culture for the learner is that which is internal and hidden, but which governs the behaviour (p. 4).

Laddicoat et al. (2003) are more specific about the dichotomy of cultural content components in learning languages. According to them, cultural issues may be expressed through context, general text structure, within utterances, in norms of interaction (selection of language units) and the language itself (grammar, lexis, prosody and pronunciation and kinesics) (p. 9).

Holme (2003) believes that culture can be introduced into the language curriculum according to five principles (the communicative, classical-curriculum, culture-free language, deconstructionist and competence views (p. 18). The five views are interrelated comprising ideas about language for quick use in a specific context, the alien modes of thought and the hidden political and cultural agenda of a language. These implicit messages can be deciphered through a competence of grasping language's true meaning (Holme, 2003, pp. 18–19).

The European Qualifications Framework for Lifelong Learning (2008) sees sociocultural competence education as an active process of creation of knowledge and meanings, which should primarily be directed towards learners' real-life current and potential future needs (p. 11). These needs include intercultural competences, though Halbach (2003) indicates that the idea of 'exporting' methodologies from one country (and culture) to another ignores the importance of personal and cultural factors in learning (p. 51). Saville-Troike (1978) supports this opinion by stating that cultural issues are evident in instruction dependent on the learning styles which are brought to school by students, curriculum (contents of a language course) and testing being itself a social event (pp. 31–35).

Scholars of ESP research emphasize that language is valuable not because it affords insights into universal structures, but because it is particularly sensitive to different social settings, particularly imbued with the social life of which it is a part (Mertz 2007, p. 17).

Wierzbicka (1999) believes all languages have words with meanings corresponding exactly to the meanings of the English words such as, 'good' and 'bad' as these are universal concepts and can, therefore, be used as elements of a culture-independent semantic metalanguage (p. 35).

Moreover, at the time of globalization scholars in subject-specific disciplines increasingly vote for unification and harmonization of terminology on an international level. They consider it a tool to eliminate misunderstandings and promote common framework for international cooperation. Thus, we witness the increase in the use of borrowed items instead of native words in languages for specific purposes. The use of borrowed words can also eliminate emotions; reduce evaluation and motivation for non-native speakers, promote stylistic neutrality, mono semantics, eliminates undesirable connotations, serves as a tool for compression of language material and a way for the lexical development.

When speaking about interlingua borrowings, Valeontis and Mantzari (2006) distinguish between 'primary term formation' (a new concept and its name) and 'secondary term formation' (a foreign substitute for an existing term) which may occur for such reasons as standardization or fashion (p. 2).

The quantitative analysis shows that cases of imported English terms (transliterations and calks) in the Russian language may constitute approximately 58 % of all terms used in a terminological system. In addition, within just one subject-specific text borrowed items may represent one quarter of all the words used.

So, what are the implications of the globalization trend? Do cultural peculiarities still matter? In order to find out if students are to be taught cultural awareness, an extra curriculum project on intercultural comparisons for Bachelor students of Law was introduced.

The importance of bilingual instruction cannot be underestimated. Gajšt (2011) attracts attention to cases where differences between the two language systems exist, e.g. in the field of accounting there are some terms that are not compatible internationally (p. 21).

Ho (2009) suggests that instructions in developing the cultural component may include points like exploring self, noticing/observation, cultural exploration, comparisons and reflections, mediation between cultures (pp. 64–65).

In fact, instruction can be divided into explicit and implicit techniques. In both types of instruction, a teacher is to combine social (to help others to understand the ideas and concepts), cognitive (classifying, comparing, matching, selecting, predicting, guessing, sequencing) and situational aspects of teaching techniques. The teacher's main concern therefore is to keep students aware of social and cultural peculiarities of the professional language, let them interpret the text and denounce their own message within the framework of language classroom activities. That may sometimes mean the transfer of 'legalese' structures into general English forms. The approximate scheme for studying a legal text may be summarized as the following:

- Looking for specific language units in a text (terms, borrowings, archaic words, specific language forms and structures) and explaining their meaning in English. One may use a dictionary or some linguistic and cultural guides, use predicting, guessing, comparing techniques or just the teacher's explanation,
- Drills prepared by a teacher based on cognitive skills like classifying, comparing, matching, selecting, sequencing, interpreting, paraphrasing etc.,
- Contextualizing through a set of communication events (discussions, role-play, case study, projects etc.).

In explicit types of instruction, particular attention should be paid to translations and use of dictionaries. Do students need to be taught translations? There are some reasons to think so. Firstly, students implicitly translate what they read or hear in a foreign tongue into their mother language for better comprehension and semantic analysis. That is why we can speak about language interference. Secondly, translation is a teaching tool that may help not only comprehend the message but also to provide more practice for language acquisition process. Thirdly, comparing the mother tongue with foreign languages students expand their cultural and professional awareness.

Melnichuk and Osipova (2017) believe that teaching translation to students can represent a multidimensional issue. They enumerate several approaches to teaching translation: structural approach (differences in the phonetic, semantic, lexical, syntactic and pragmatic structures), cultural approach (culturally stipulated gaps in knowledge about language and its concepts) and professional approach (i.e. knowledge about that particular vocational field) (p. 26).

In fact, cultural approach is present in the other two types as the language structures and terminology always contain some cultural verbal elements.

Another corner stone is the use of dictionaries – linguistic, non-linguistic, monolingual, bilingual, phraseological, synonyms dictionaries, etc. Extensive use of dictionaries gives information and provides expertise in general vocabulary expansion.

Moreover, we emphasized the importance of context as one of the most important elements for defining the true meaning of a word. Using corpora in both the studied language and the mother tongue can be a useful resource stimulating classroom cognitive activities.

Another point for consideration is organizing classroom activities is commentary – oral discussions and written tasks. Discussing information students get from dictionaries can be subsequently supplemented by written tasks such as compiling word maps and writing essays about the cultural peculiarities of the words. Ivanishcheva (2016) finds it difficult to draw a line between definition of a lexical meaning of a word and additional information about realia, which are a part of a commentary (p. 81).

## 3 Methodology

We carried out the project, in order to find out whether cultural issues still stand out and are noticeable for students majoring in Law.

The underlying methodology includes the stages of empirical research in terminology for law and gathering feedback from the participants.

The textual input was drawn from educational literature (textbooks such as International Legal English by Amy Krois-Lindner, Jeremy Day), additional reading from mass media sources (e.g. The Economist), legal documents (directives, agreements, letters, pleadings) and scientific literature from open sources of information selected according to the theme studied by students within the syllabus of their main course. Students read and selected terms and terminological units as their home assignments. They conducted a comparative analysis of semantics, etymology, degree of metaphorisation, contextual use, peculiarities of translation, concept making and socially significant interpretation of about 1000 English and Russian legal terms. The findings were organized as a Google Table resource open to all the participants for corrections and discussion inputs. Students also gathered once a week throughout a term to present their investigations as presentations with consequent discussions. The teacher also issued instructions on the use of translation techniques, recommended dictionaries and expanded on properties of terms in respect of their concept-making functions. Students exchanged notes and

discussed the contextual use of selected terms. These synthesizing activities allowed for analysing the input and inducing the meanings and functions of terms, i.e. the use of Latin words and archaisms, etymological insights, language parallels between the English and Russian languages, and comparisons of speech formulae in the source and target language.

To evaluate the didactic value of the project, we collected feedback from the participants. In fact, students were asked to assess the impact the activities carried out within the project framework had on the processes of:

- memorization (Did insights into the meaning of words help you remember these w o r d s better?)
- professional development (Has the project helped you develop professionally – to a c q u i r e new knowledge in your subject-specific area?)
- skills in translation (Are you now more or less able to translate professional texts?)
- mental perceptions and intercultural tolerance (Did the information you got during the project change your attitude to the other nation's ways of life)
- motivation in studying a foreign language (Are you more motivated to study English now?)
- communication skills (Do you have fewer difficulties in communication with foreigners now?)

Thirty students, participant of the project, were to answer the questions and score each answer according to the scale from 0 to 6 (where 0 is "no", 1 "I doubt", 2 "probably", 3 "sooner yes than no", 4 "yes, a bit", 5 "yes, sure" and 6 "yes, enormously").

## 4 Results

### 4.1 The Content Aspect

The English legal system was generally developed from Latin–Old French–Old English–Modern English. Therefore, there are three groups of words typical for Legal English such as actually Latin words, loans commonly used in modern language and some archaic words of a different language origin.

Actually Latin words like *lex loci actus*, *res gestae*, *corpus delicti*, *lex domicilii*, *bona fides* retain their meanings and spellings but are pronounced in a different way. Some of them are contractions, for instance, *vs.* (*versus / against*). Latin is on the curriculum of Law departments and students do not find it hard to understand such terms but there are some difficulties in pronunciation. It is also noted that Latin contractions are not used in Russian legal texts as often as in English.

Loan terms from old French substitute a very large group of historical elements in the language: *testament* (instead of *will*), *larceny* (instead of *theft*), *evidence* (instead of *hearsay*) etc.

The so-called 'doublets' can also be considered as French borrowings: *goods and chattels*, *had and received*, *will and testament*, *fit and proper*, *free and clear*. The word combination *last will and testament* is the repetition of the same notion: a document that says what a person wants to do with his or her property after they die. Etymologically *testament* is a covenant, especially between God and humans, which reflects religious aspects of cultural life. In modern English *testament* is mostly used in either the meanings *evidence* or *a part of the Bible*. Therefore, we can perceive this document as a God-blessed document, something that cannot be disputed. The Russian *завещание* does not make such mental implications.

The French language influence can be traced not only on the lexical level but also in grammar forms. For example, noun + adjective structures clearly demonstrate it: *condition precedent*, *letters testamentary*, *malice aforethought*. Structures like that are not typical for the Russian legal discourse.

Archaism is the use of a form of speech such as a word, phrase or usage that has fallen out of the general use, but is still used in the professional register. One of the brightest examples is the use of archaic adverbs, adverbials and conjunctions that help to navigate throughout a legal document:

> *Therefore*, in consideration of the premises, and the representations, warranties, covenants and undertakings of the parties *hereinafter* set forth, and for other good and valuable considerations, the parties agree among themselves as follows: …

These conjunctions assist deductive reasoning applied by lawyers since ancient times. They can be used for cognitive and logic operations like focusing, linking, connecting, structuring, sequencing. The language of law also uses formal and ceremonial phrases, e.g., *be it enacted by the Queen's most Excellent Majesty*.

Bookish words are frequently thought of as old-fashioned expressions and can easily be mistaken for archaic words. However, dictionaries usually define such words as literary or formal in tone. They are often used in legal documents in place of their neutral equivalents, for example *deem* instead of *consider*: The distributor shall be *deemed* to include any hire or purchase of the same. These are common features for both English and Russian.

Another field of the Legal language, which may reflect some cultural elements, is terminology. Terms as language units, that denote legal concepts. To understand them properly we need to compare the confronted legal systems. The relatedness of the source-target languages (English and Russian in our case) can be misleading. The existence of false equivalents, such as *директор* meaning a boss (administrative duties) versus *director* as a member of the board of directors (mostly voting rights and supervision of decision-making in a company), proves it.

Many borrowed words undergo a lexical internal development, i.e. a new meaning is formed which does not exist in the original language (Stojani, Vrapi 2015, p. 82). These are the same words borrowed at different times from the same source language. *Fiscal policy – фискальный, денежный, налогово-бюджетный*. It is clear that *фискальный* takes some negative connotations in the Russian language – being initially a neutral Latin word, which comes from *fiscus* – with time the word *фискальный* has come to be treated with disdain, meaning too much tax levied.

The merit of such intercultural comparisons lies in the fact that they help expand students' professional knowledge and work out competences necessary for work in international environment. The historical background of a term's coinage, its etymology is vitally important for understanding some professional issues. Thus, in order to understand the term *Basel I, II* and *III* one needs to know that the Basel Accords refer to the banking supervision accords (recommendations issued by the Basel Committee on financial institutions' capital adequacy).

Intercultural discrepancies can affect denotation processes in the following fields:

- legal professions and education;
- legal institutions and structural units;
- legal procedures.

For example, such British terms as *lawyer*, *counsel*, *advocate*, *attorney*, *solicitor*, and *barrister* do not have full equivalents in the Russian language. Therefore, they have to be explained through the functions these professionals perform and then compared to the Russian terms. The term *Queen's Counsel* means a title given to senior counsels, who must be barristers, when the sovereign is a woman. In English *counsel* may mean a person who provides legal representation but he does not need to be a barrister. The terms *judge*, *justice*, *magistrate* have only one Russian equivalent *судья*, but in English, they mean different positions. In English there are two words used to denote a judicial assembly whose task is to

hear and submit a decision on cases at law – *court* (a permanent body) and *tribunal* (ad hoc by nature but not necessarily connected with military cases), whereas in Russian the word *трибунал* refers to the military language and has negative connotations. In England, the court hierarchy comprises the European Court of Justice as the ultimate appellate court, House of Lords, the Court of Appeal (with its two jurisdictions – criminal and civil), the High Court of Justice and the Crown Court, the County Courts and the Magistrates Courts, the last four courts being opposite in jurisdiction (civil vs criminal). This structure is hardly comparable with the Russian court system, which is divided into constitutional, general (both civil and criminal) and arbitrage jurisdiction and has quite a different type of hierarchy.

Conceptual differences are found in the area of different legal procedures and notions connected with them. For instance, *direct action,* which is a form of criminal, aggressive contempt, or *equity,* which means the law of justice employed as an additional legal system when Common Law fails to exercise its duty fairly (it has been in use since the 14th century and in the past was practiced in different from Common Law courts). Both terms are impossible to translate into Russian apart from in a descriptive way and these legal phenomena are either absent or have a different form in the Russian legal system.

Depending on the register of speech, words change their meanings. For example, *consideration* in a legal contract is a monetary or other type of reward rather than reflection or discussion.

Students also have to know some commonly used abbreviations such as *All ER* or *WLR* that mean the two series of law reports – The All England Law Reports and The Weekly Law Reports. In the names of cases, e.g., *Brown v. Brown, 1999 ND 199, 600 N.W.2d 869* the index attached to the case shows the registered number of the volume where the case record can be found.

The use of proper names can reflect cultural peculiarities of the language. In courts, for example, proper names are used without Mr. or Mrs. before them: *It is stipulated that Elliot advised Gilligan that…*

Differences between British and American English can be traced in legal documents. That is important as it helps students realize which country a document originates from: *Competition Law* (Br) / *Antitrust Law* (Am), *abuse of a dominant position* / *abuse of monopoly power*.

The next sphere where cultural context and background knowledge can be applied is the use of metaphorical expression and idioms in legal texts:

- *by the book* (following all the rules when you do something);
- *burden of proof* (the necessity to prove a disputed fact as required by the laws of evidence);
- *an act of God* (an event or accident due to natural causes for which no human is responsible and which could not have been avoided by planning ahead).

### 4.2 The Didactic Aspect

The results of the survey conducted with the aim of finding out the pedagogical effect of the work done are presented in Figure 1.

As you can see, the two didactic points most influenced by the project were professional development (in subsequent interviews students noted that now they know more in their subject-specific area), memorization processes (it is really easier to remember the word if you have done some investigation into its meaning) and motivation. Participants were volunteers and the project was an extracurricular activity. Thus, it is quite possible to state that the participants' motivation was the result of their own educational preferences. Translation techniques, being a part of the project instruction, were duly developed and highly assessed by the participants. As for intercultural tolerance, it is an inherent component of Russian mentality. Being a multinational state, there are no prejudices towards other

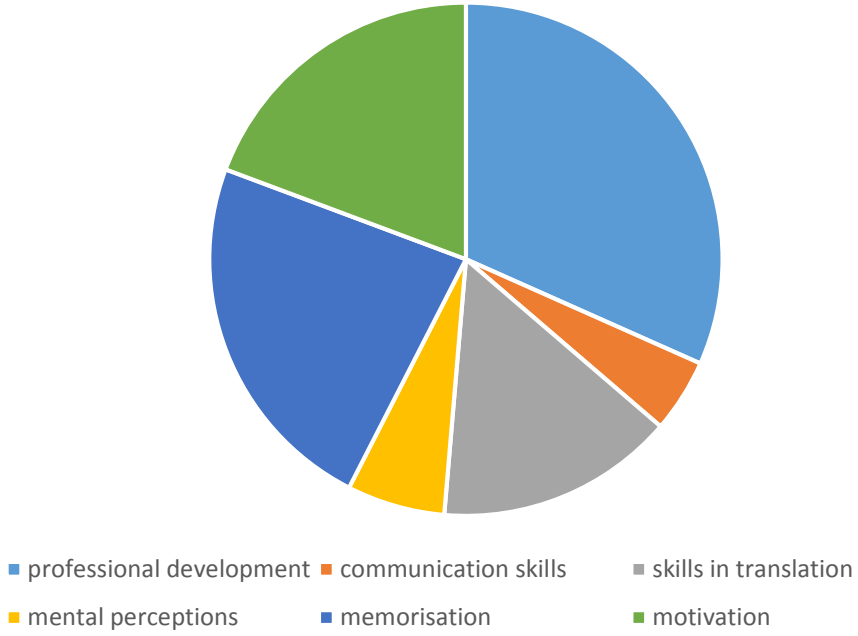


Figure 1: *The Positive Impact of the Project*

cultures in Russia. The disappointing point is the lack of communication activities.

## 5 Discussion

The rationale for the project was based on such theoretical didactics as intercultural competence, types of classroom instructions, content-based and project-based approaches in teaching ESP. The content component was provided by the insights into semantics, etymology, translation studies and lexicography. The results show that some research into the nature and meaningful properties of words can enormously enhance students' cultural awareness.

The survey conducted at the end of the project suggests that such projects help students acquire professional knowledge; boost their cognitive abilities and translation skills.

Still the communicative aspect of the project was the weak point. On the one hand, projects allow collaborating orally and working out a scheme for organizing professional knowledge in mental blocks or conceptual fields, and introduce perspectives for further investigations. Cojocariu et al. (2016) state that project-based learning appeared as an antithesis to a rigid mass education system, frontally organized, obsessed with results, with quantity of pupils' acquisition where a teacher holds authoritatively the knowledge (p. 9). Nevertheless, now some scholars have criticisms concerning the use of project-based learning methods. Comparing the duration, the nature of problems and tasks, the definition of problems, the structural didactic elements of the process of work, the degree of theorization, the role of the teacher, the outcome and assessment, Brassler (2017) concludes that problem-based learning is found to achieve better results than project-based learning (p. 11). Thus, future research should be aimed at working out a scheme for conducting problem-based, but not project-based activities for cultural studies.

Despite the above-mentioned drawbacks of the taken approach, there was much positive impact of the project expressed in the increase in motivation, professional knowledge, mnemonic abilities and translation skills.

In general, cultural bias has positive impact on intercultural communication. Projects designed to enhance cultural awareness may boost cognitive processes in language acquisition and students' professional development, as well as eliminate misunderstandings in verbal performance and help raise people who know who their 'kith and kin' are.

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# Documents and Teachers in Designing Tertiary ESP Courses in Poland

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## Abstract

The article presents an analysis of ministerial and internal faculty documents, that shape the design of tertiary ESP courses in Poland, as well as the results of a small-scale study conducted among subject teachers at the Faculty of Mathematics of the University of Białystok. The analysis of the documents has revealed a number of problems with these documents. Many of them seem to stem from the misunderstanding of the process of teaching a foreign language. Some of these issues are also revealed in the teacher survey alongside a certain discrepancy between the language requirements and the respondents' opinions. While some of the problems are systemic (caused by the process of developing these documents and people's attitudes towards them) and therefore cannot be easily solved, a number of improvements such as more balanced approach to the development of language skills or a different selection of texts for students to work with could be made through cooperation between content teachers and language teachers

**Key words:** ESP courses, tertiary education, document analysis, language requirements, English for Mathematics, cooperation

## 1 Introduction

The work of teachers of all levels in Poland is strongly controlled by various ministerial and internal regulatory documents. In the case of tertiary education this includes *Teaching standards* issued by the Ministry of Science and Higher Education, which form the basis for documents developed by individual faculties such as general *Teaching outcomes* and *Programmes of study* for individual fields of study[1]. This article presents an analysis of these documents, as they apply to ESP language courses in a non-linguistics field of study. The issue in question is whether these documents are more of a help or a hindrance to language teachers, as well as how well they fit with the actual needs and expectations of students and language instructors. To answer this question, the author has conducted a qualitative analysis of the aforementioned documents, as they apply to BA studies in Theoretical Mathematics at the Faculty of Mathematics of the University of Bialystok. Furthermore, content teachers were questioned with regard to how they perceive language requirements from the *Programme of study for Theoretical Mathematics*.

The article is divided into four parts. The first part is a short description of documents that shape the design of tertiary language courses, the second part discusses faculty requirements for language courses, the third part presents the results of a small-scale study conducted among faculty content teachers and in the final part the author conclusions and possible ways of cooperation between language teachers and content teachers in designing language courses.

## 2 Documents shaping the design of tertiary ESP language courses in Poland

*Teaching standards* were developed by the Polish Ministry of Sciences and Higher Education for 118 fields of study. They are sets of requirements for programmes of study which are obligatory for all institutions of higher education in Poland.

These documents are divided into six main parts for BA programmes, into five main parts for MA programmes and into six main parts for long cycle programmes[2]. The parts of the documents are as follows:

- **General requirements:** this part specifies the number of semesters, teaching hours and the minimum number of ECTS (European Credit Transfer System) points.
- **Qualifications of a graduate:** this is a general description of graduates' knowledge and skills. This part also states that a graduate should be prepared to take up a job and to follow an MA or a PhD programme.
- **General teaching content**: this part details concepts to be taught within the group of topics obligatory for all the students and within the group of topics which students will learn depending on their major. This part also provides the teaching outcomes, divided into skills and competences for each topic, as well as the minimum number of teaching hours and ECTS points for each group.
- **Professional practice:** this part specifies, among others, the minimum duration of professional practice.
- **Other requirements**: this part contains, among others, the minimum number of teaching hours and ECTS points for physical education and IT classes.
- **Recommendations:** the content of this part will specifically depend on the requirements of a given field of study.

1 "Field of study" in this context does not refer to a research area or a branch of science, but a group of subjects or areas of knowledge taught together at a university. This is similar to a minor and/or major in the American system.

2 Five-year studies leading to an MA degree

As regards foreign languages, requirements can be found in the part **General requirements** where it is stated that a graduate of a BA programme should know at least one foreign language at B2 level of CEFR (or higher) and a specialised variety of the language. The part **Other requirements** determines the number of teaching hours and ECTS points assigned to language courses whereas the part **Recommendations** suggests the language that students should learn.

According to ministerial *Teaching standards for Mathematics*, a student during the BA programme thus learns English for 120 lessons (one lesson lasts for 45 minutes) to reach at least upper-intermediate level (the language course is worth 5 ECTS points). He or she should also learn a specialised variety of English, but its level is not stated in the document.

Ministerial *Teaching standards* are the basis for individual faculties, that develop a document titled *Teaching outcomes*. The first part of the document — **General information** — specifies, among others, general teaching aims, graduates' employment opportunities, the involvement of other parties, such as faculty authorities, students' council, or potential employers in defining teaching outcomes. The second part of the document — **Teaching outcomes** — presents in detail the teaching outcomes for a given field of study. The outcomes are divided into three sections: **Knowledge**, **Skills**, and **Competences**.

As regards foreign languages, the *Teaching outcomes* developed by the Faculty of Mathematic of the University of Białystok state that a graduate of a BA programme should know at least one foreign language at B2 level (**Knowledge** section) and that he or she should be able to search for information in professional literature both in Polish and foreign languages (for reasons hard to fathom this is put in the **Social competences** section).

As for employment, a graduate should be able to find work with: 1) institutions using mathematical methods, 2) primary schools, junior high schools (which have since been removed from the system due to the 2017 educational reform) and vocational schools, if they complete the optional teacher training course.

This general document is the basis for more detailed documents tilted *Programmes of study for day (extramural) studies* which present intended teaching outcomes for the whole cycle of studies for students of a given field of study within one faculty. For example, at the Faculty of Mathematics of the University of Białystok at BA level there are programmes of study for Financial Mathematics, Theoretical Mathematics, and Information Safety.

The *Programme of study for Theoretical Mathematics* for the BA programme specifies teaching outcomes for 37 modules (e.g. Topology, Algebra, Differential Calculus). In the document there are four language modules each corresponding with one semester. The author of the article analysed this programme because she teaches students of Theoretical Mathematics and is therefore obliged faculty regulations while designing and ESP course.

Table 1 presents teaching outcomes for ESP courses, divided by semester. The phrases in bold in the table indicate new requirements that are introduced in a given semester. The language requirements were literally translated from the faculty documents.

Table 1: *Requirements from the Programme of study for Theoretical Mathematics concerning foreign language courses*

| Semester 1 | Semester 2 | Semester 3 | Semester 4 |
|---|---|---|---|
| A graduate has basic knowledge of mathematical terminology in foreign languages.<br>A graduate can:<br>– prepare a summary in foreign languages of a popular science article about mathematics<br>– translate into Polish a popular science article about mathematics published in a foreign language<br>– prepare in a foreign language an auto-presentation, a short paper on basic mathematical concepts (encyclopaedic entry)<br>– discuss in a foreign language graphs and the results of mathematical calculations<br>– write: informal and formal letter, a report | A graduate has **basic but systematic** knowledge of mathematical terminology in foreign languages.<br>A graduate can:<br>– prepare in a foreign language a report, a **write-up** and a summary of a popular science article about mathematics<br>– translate into Polish a popular science article about mathematics published in a foreign language<br>– prepare in a foreign language an auto-presentation, a short paper on basic mathematical concepts (encyclopaedic entry)<br>– **discuss in a foreign language data sets** (presented for example in tables) and the results of mathematical calculations<br>– write an informal letter,<br>**an email with instructions,**<br>**a description** | A graduate has systematic knowledge of mathematical terminology in foreign languages.<br>A graduate can:<br>– prepare in a foreign language a report, a write-up and a summary of a popular science article about mathematics<br>– translate into Polish a popular science article about mathematics published in a foreign language<br>– prepare in a foreign language an auto-presentation, a short paper on basic mathematical concepts (encyclopaedic entry)<br>– discuss in a foreign language graphs and the results of mathematical calculations<br>– write formal letter/ email,<br>**a description of an object**<br>– **find, understand and analyse information from different sources (for example from foreign professional literature) which corresponds with his or her major**<br>**A graduate participates actively in discussions conducted in a foreign language** | A graduate has systematic knowledge of mathematical terminology in foreign languages.<br>A graduate can:<br>– prepare (orally and in writing) in a foreign language a report, a write-up and a summary of a popular science article about mathematics<br>– translate into Polish a popular science article about mathematics published in a foreign language<br>– discuss in a foreign language graphs and the results of mathematical calculations<br>– **prepare summary of his or her BA thesis in a foreign language**<br>– **knows a foreign language at B2 level of CEFR**<br>– write an informal letter, **speech, essay**<br>– find, understand and analyse information from different sources (for example from foreign professional literature) which corresponds with his or her major<br>– **lead a discussion in a foreign language and is able to sum it up**<br>**A graduate knows how to negotiate, mediate and reach a compromise in a foreign language.** |

## 3 Language requirements from the *Programme of study for Theoretical Mathematics*

The language skills and knowledge from the *Programme of study for Theoretical Mathematics* were put into a syllabus and language teachers were asked to provide content. In the first place they had to decide what basic mathematical terminology in this context is.

In order to do so, language teachers would need to build a corpus of texts related to faculty content subjects in cooperation with faculty content teachers who know which vocabulary items obtained through the corpus analysis are subject-obligatory and could be treated as basic mathematical terminology. However, this is a long-term project and does not provide teachers with immediate answers about the content of their courses or rather lists presenting the scope of mathematical concepts to be taught, that are required of language teachers in October, when language syllabi are accepted by the faculty.

Clues to the choice of specialist vocabulary to be taught can be found in other requirements from the *Programme of study for Theoretical Mathematics*: students are expected to be able to discuss graphs, data sets (presented, for example, in tables), and the results of mathematical calculations. To do so students need to know, for example, the names of different graphs basic operations, algebraic and calculus symbols in English.

The choice of terminology should also enable students to prepare a summary of their BA thesis. However, language courses at the Faculty of Mathematics of the University of Białystok end when students are in their second year and their diploma seminars, where they discuss the content of the dissertation, begin in the third year. Consequently, students will not be able to prepare a summary of their BA thesis during a language course, as they do not know yet what issues they will be researching.

Another requirement according to the *Programme of study for Theoretical Mathematics*, is that a graduate should be able translate into Polish a popular science article about mathematics. Such a statement confirms that "the essence and complexity of translation activity is commonly misunderstood and underestimated" (Hejwowski, 2004, p. 235). Hejwowski further argues that it is commonly believed a person who has learned a foreign language can translate any text into and from the foreign language. Translation competence does include a good knowledge of at least two languages, but it is usually developed through many years of practice. Consequently, not every language teacher, if they do not have the appropriate training and/or experience, will be able to translate, let alone teach translation to upper-intermediate students.

Popular science articles frequently use more complex language structures than specialist literature, which tends to focus more on clarity and precision than on style. Pluta (2008, p. 47) observes that tertiary students will find it easier to understand specialist rather than popular science articles from their field of study, as the specialist knowledge they gained in other subjects will help them grasp the message of the text and compensate for inadequacies in language knowledge, which would otherwise impede understanding of the text. Taking all this into account, if translation is at all to be required, it would make more sense for students to translate specialist texts.

Another skill listed in the faculty programme of studies is the ability to prepare a summary of a popular science article about mathematics in foreign languages. Since specialist texts are clearer and more precise than popular science articles, it would make more sense to require that students summarize specialized articles.

The authors of the requirements put a lot of emphasis on writing skills. Apart from preparing translations and summaries, students have to know how to write formal and informal letters, formal emails, emails with instructions, a description, a description of an object, a speech and an essay. Writing formal and informal letters is emphasized already in the first semester, but one could argue that paper

correspondence is an obsolete skill for students who belong to the generation of digital natives. However, BA graduates should know how to write a formal email. Students are also required to write an email with instructions, but it is not clear what it means. Another question is whether graduates of mathematics really need to be able to write, of all things, an email with instructions (whatever that may be)?

Equally baffling is the statement that students should be able to write a description. A description of what? A person? A room? A landscape? The requirements for the first semester of the second year are more specific: a description of an object. However, it is not defined what an object is for a mathematician and if it is even relevant.

It is also difficult to interpret the statement on students being able to write reports and write-ups[3]. Without cooperation with content teachers a language teacher will not be able to establish what types of reports or write-ups mathematicians prepare, or how often they need to write them. Consequently, they will not be able tell how much attention should be devoted to these forms in the language classroom.

After the fourth semester of a language course students are required to know how to write a speech but they do not have to be able to deliver it. Instead, they need to be able to prepare oral reports and write-ups. It is hard to imagine why mathematicians would need to be able to write speeches which they are not going to give. It would make much more sense for graduates to be able to prepare and present a paper at a conference. The ability to present a paper is mentioned, but it is supposed to cover basic mathematical concepts, which would only be useful on the rare occasions when teachers of mathematics might be called upon to teach a class in a foreign language.

The last writing skill language teachers are required to develop is writing essays. Again, why do mathematicians write essays and how important is this skill for them? Perhaps this statement should be interpreted as an element of developing students' general language skills? After all, graduates are required to know a foreign language at B2 level of CEFR.

Such a strong emphasis on writing skills is probably caused by the fact that it is only content teachers who authored the language requirements and they are obliged to pursue academic careers, which involves, among others, publishing articles in English. It is likely that the skills in the requirements, not only the writing skills, are the ones faculty academics use and perhaps that is why they assumed that students would also need them. According to the requirements, graduates should be able to find, understand and analyse information from different sources (for example from foreign professional literature), which corresponds with their major. These are exactly the skills a person should possess to pursue an academic career and prepare academic publications. These are useful skills, albeit only for a minority of graduates who would like to follow their vocation in academia or in science popularisation.

Moving away from writing, as far as speaking is concerned, interaction is only mentioned in the requirements for the third semester and yet first-year students already know how to interact orally in English, as the majority of them had learnt the language in secondary school and took their final written and oral exams. If students are not expected to develop their speaking skills during the first year in more diversified ways than it is indicated in the requirements, their speaking skills, and especially interacting with others, will probably deteriorate. The way the requirements for speaking are formulated means that students are thrown in at the deep end in the third semester: there is a huge gap between being able to discuss the results of mathematical calculations or delivering an auto-presentation and being able to participate actively in discussions conducted in a foreign language.

3 In the Polish version of the language requirements the authors use the words *rapport* and *sprawozdanie*, which are synonyms in Polish and without adequate context, are almost impossible to either distinguish or translate precisely. No such context was provided and therefore the author of the article used the English word 'report' for *rapport* and 'write-up' for *sprawozdanie*.

To become effective communicators, students need to be systematically guided and supported in how they develop relevant speaking skills (Goh, 2017, pp. 245–246). The faculty language requirements do not allow for such systematic support. That is why requiring students in the fourth semester to be able to negotiate, mediate and reach a compromise in a foreign language, or to be able to lead and sum up a discussion is unrealistic, because they have neither the time nor the opportunity to develop the necessary skills, especially that the language requirements are already quite demanding. Another question is how the speaking skills students have to master will relate to their communicative goals as graduates of mathematics?

That brings us to the issue of needs analysis which is one of the major pillars of English for Specific Purposes (ESP) (Harwood & Petrić, 2011, p. 245). Needs analysis can be defined as the process of gathering and interpreting information on how language learners will use the target language outside classroom walls (target situation analysis TSA; Widdowson, 2000, p. 196).

As was mentioned before, the faculty *Teaching outcomes* state that a graduate of BA programme should be able to find employment in the school system or in institutions using mathematical methods. Before designing an English for Mathematics course one would have to research how and when Polish primary school teachers of mathematics use English during their lessons.

According to the latest Core Curriculum for primary schools, schools are allowed to introduce bilingual education in the two final classes. This means that graduates of Mathematics would have to be prepared to use English in the context of language and content integrated learning (CLIL). However, it should be noted that it is not obligatory for schools to introduce CLIL. Since most Polish teachers of mathematics are not expected to teach in English, CLIL should be included in the language requirements but not prioritized.

As for employment in institutions using mathematical methods, the content of a language course should probably be designed in cooperation with relevant institutions. At the very least, language teachers should communicate with content teachers in order to establish what is meant by institutions using mathematical methods and what their language needs in terms of mathematical English might be.

## 4 Research project

### 4.1 Methodology

Since ministerial language requirements are very general and therefore open to interpretation and faculty language requirements, even though more detailed, do not seem to take into account actual needs of graduates, research was conducted to gather content teachers' views concerning tertiary language teaching. The research was motivated by the following research questions:

1. What language level should graduates of the BA programme possess?
2. What level of the specialised language variety should graduates of the BA programme represent?
3. What proportions should there be between English for General Purposes (EGP) and English for Specific Purposes (ESP) in a language course?
4. Which language skills (specialised or general) should be emphasized during a language course?
5. Which skills and knowledge listed in the *Programme of study for Theoretical Mathematics* should be emphasized most strongly in a language course?

The research tool was a self-administered questionnaire. The language of the questionnaire was Polish. At the time of the research, the Faculty of Mathematics of the University of Białystok employed 36 content teachers, but only seven of them completed the questionnaire. Even though the findings

cannot be generalized because of low response rate, the answers provide interesting insights into how the respondents, who are content teachers, perceive the requirements for language courses.

### 4.2 Interpretation of the results

The first question item on the questionnaire concerned the language level. Four out of seven respondents indicated that graduates should know a foreign language at the upper-intermediate level, which corresponds with ministerial regulations. Two respondents indicated the advanced level and one person opted for the intermediate level. As regards the level of the specialised variety of the target language, four respondents indicated that the level of ESP should be the same as the level of EGP and three people thought that the level of ESP should be lower than the level of EGP. In reality it is difficult to obtain the same level of EGP and ESP, because the abilities do not translate well from one to the other and language teachers have too little time (120 lessons) to take students to at least B2 level of EGP (especially when they start at A2/B1 level) and at the same time to teach them ESP to the same level of competence.

As for the proportions between EGP and ESP, four respondents think that a language course should include elements of both EGP and ESP, but with the main emphasis put on general English. Two respondents indicated that students should learn only a general variety of the foreign language and one person indicated that ESP should be emphasized more than EGP during language courses. These opinions seem to contradict the answers concerning the language level: the majority of the respondents think that students should know ESP and EGP at the same level and yet they argue that language teachers should devote more time to developing general language skills. This is especially paradoxical as students enter university with a certain degree of knowledge of EGP but usually with no knowledge of ESP.

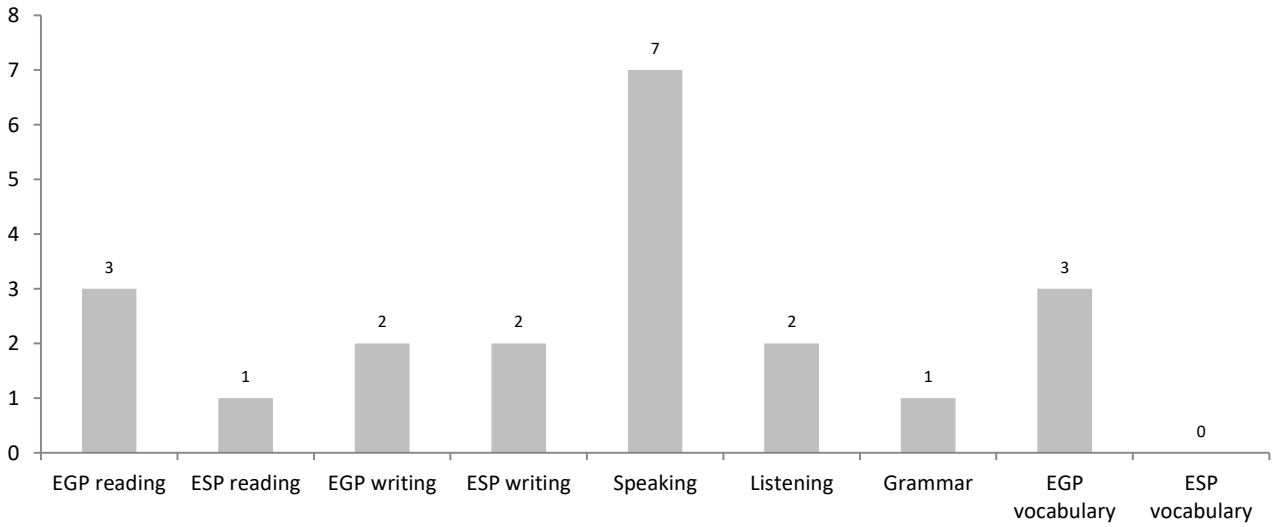


Figure 1: *The importance of skills in a language course*

The analysis of answers to question 4 revealed that all the respondents think that speaking should be emphasized the most in a language course, whereas in the faculty language requirements speaking is one of the most neglected skills. In the second place the respondents indicated developing EGP reading skills and improving EGP vocabulary, which are not mentioned in the requirements at all. Interestingly, none of the respondents thought that language teachers should help students broaden their knowledge of ESP vocabulary which is the most stressed aspect in the *Programme of study for Theoretical Mathematics*. This might be due to the fact that content teachers are likely to know how to express mathematical concepts in English and assume that students, just like them, can learn it

independently of the teacher. The obtained data also shows that the respondents would want more attention to be devoted to general rather than specialised language skills, but general language skills are virtually absent from the language requirements.

The last question in the questionnaire contained all language requirements from the *Programme of study for Theoretical Mathematics* and the respondents were asked to indicate those 5 which should be emphasized most in a language course. Table 2 presents the requirements sorted by the number of "votes" they received.

Table 2: *The importance of skills from the Programme of study for Theoretical Mathematics*

| The skills | Number of responses |
|---|---|
| Preparing an auto-presentation | 6 |
| Leading and summing up a discussion | 6 |
| Searching for and analysing information from different sources (e.g. from foreign professional literature) | 4 |
| Preparing a summary of a popular science article in a foreign language | 4 |
| Preparing a summary of a BA thesis | 3 |
| Translating into Polish a popular science article in a foreign language | 3 |
| Discussing graphs and the results mathematical calculations | 2 |
| Preparing a report in a foreign language | 1 |
| Preparing a write-up in a foreign language | 1 |
| Presenting a short paper on basic mathematic concepts | 1 |
| Writing an essay in a foreign language | 1 |
| Negotiating, mediating and reaching a compromise | 1 |

According to the respondents, two most important skills require a good command of a spoken language, the development of which, as it was already mentioned is not prioritized.

In the second place the respondents indicated *searching for and analysing information from different sources* and *preparing a summary of a popular science article in a foreign language* – skills which can be more useful for people pursuing their academic careers, than for teachers of mathematics or mathematicians in non-academic institutions.

In the third place the respondents chose *preparing a summary of a BA thesis*, which is a surprising choice, because, although almost all students are guaranteed to need it, they will probably only use it once. The same number of responses was accorded to *translating into Polish a popular science article published in a foreign language*. It should be reiterated that the time and effort needed to obtain this level of linguistic ability is beyond the scope of the language course in question.

The remaining skills indicated by the respondents are the ones that are best developed with the teacher's support and perhaps that is the reason why respondents think they should be included in a language course. Interestingly, none of the respondents indicated the development and systematization of mathematical terminology.

## 5 Discussion

The analysis of documents which shape the design of tertiary language courses in Poland has shown what consequences the lack of cooperation between content teachers and language teachers might have on formulating language requirements.

At present, the faculty language requirements are based on such misconceptions as: "knowing a foreign language means being able to translate", or "popular science articles are easier to understand and consequently to translate and summarize, than the specialist ones". Moreover, the requirements make language teachers develop too many skills at one time. During a four-semester course language teachers also have to develop skills (e.g. translating) which would normally be taught during long cycle programmes with students majoring in these skills. Additionally, language instructors struggle to interpret vague statements, such as *writing descriptions of an object*, in the context of English for Mathematicians.

If asked to cooperate while developing language requirements, language teachers would be able to tell how many language skills and how much knowledge (i.e. the scope of mathematical terminology) can be developed during one semester. They would also be able to suggest a more balanced approach to the development of all language skills and provide more suitable scaffolding (Goh 2017, p. 248) for the development of language skills. Furthermore, language instructors would be able to select appropriate texts to work with. Additionally, in view of the fact that a graduate of a BA programme is required to know a foreign language at least at B2 level of CEFR and its specialised variety, language teachers could help design the course in such a way as not to neglect the general variety and support the development of the specialized language, the level of which would probably have to be lower than that of general English.

The analysis of the *Programme of study for Theoretical Mathematics* also suggests that no needs analysis was conducted as far as graduates' employment opportunities are concerned. As they are currently formulated, the skills and the knowledge that students have to master are more suitable for future teachers conducting research and working in institutions of higher education rather than for teachers of Mathematics in Polish primary schools.

It is questionable whether there is indeed a need for graduates to have mastered ESP, considering that almost nothing indicates that many of them might need it in their future careers. Neither do they need it for learning, as at present English is not required for preparing for other classes.

The discrepancy between these language requirements and the opinions expressed by the respondents in the teacher survey combined with the low response rate suggest that these documents are not taken very seriously, perhaps because they are seen as more of a formality than an actual useful document.

One of the aforementioned discrepancies is that respondents put far greater emphasis on general rather than specialized language skills. They also stress the importance of language skills different than those stressed in the documents (e.g. speaking rather than writing). Interestingly, they do not foster the need to teach specialist vocabulary and emphasize most skills that cannot be self-taught. However, they repeat some of the misconceptions about language teaching expressed in the language requirements, for example: the need to teach translating and summarizing popular science articles.

All this suggests that it might be preferable for language teachers to take a leading role in preparing the learning requirements, while content teachers might have more to offer in creating specific syllabi content, such as vocabulary lists – the opposite of the current situation.

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# Teaching Languages for Medical Purposes for International Students

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**Abstract**

Over the past few decades the student body of the Medical School of the University of Pécs has become more and more international. A large student population comes from Norway, as UPMS and the Bjorknes Hoyskole (BH) in Oslo developed a joint programme in 2006, where Norwegian students start their medical studies in Norway and pursue them in Hungary. The students study Hungarian for medical purposes in both programmes, either using their mother tongue or English as a foreign language is as a medium of instruction. However, no research has been carried out so far to investigate the role of the language of instruction used in teaching in Hungary. The aim of the paper is to present the results of the first survey of a longitudinal study carried out to compare the two educational systems in Hungary and Norway. The primary objective was to identify whether the language of instruction has an effect on language acquisition. The results revealed that, as opposed to our hypothesis, there was no major difference in the language acquisition of the two main groups of students studying medical Hungarian in their mother tongue or in English.

**Keywords**: international, medical, Hungarian, language of instruction, LSP

# 1 Introduction

Teaching Languages for Specific Purposes (LSP) has become more complex recently, and it is an outstanding task due to the constant change and development of the modern and international higher education environment. Therefore, studies should focus on the cultural aspects of language teaching and on teaching methods meeting the needs of the new generations. This is particularly important in an intercultural setting, where educators now recognize the importance of being adequately prepared to work with students originating from different cultural backgrounds. The present longitudinal follow-up Norwegian-Hungarian comparative study aims to scrutinize the teaching of Hungarian for Medical Purposes from the perspectives of Norwegian, German and English as languages of instruction. An online questionnaire and oral tests were conducted, focusing on students' development in Hungarian as a second language for medical purposes. Student surveys serve as a proper platform to collect and analyse data, as well as to compare and contrast student populations with different backgrounds.

## 1.1 Higher education across the globe

For several decades, higher education worldwide has been transforming from national into international institutions (Németh & Szántóné, 2016). Universities and colleges offer their services not only to the local market,but recruit potential students from all over the world. The European student environment is also undergoing radical changes. More and more students go to study abroad either through various bilateral agreements, European Union-level mobility programmes, such as the Erasmus programme, or as international, degree-seeking students. Globalization and world-wide migration are also part of the reason why the scope of higher education has completely changed, thus enabling increased contact of diverse cultures (Németh et al., 2009).

As a consequence, the number of international students has been increasing quickly. In 2001, there were only one million students studying in a country, which was not their native land, but their number grew to 3.7 million by 2009 (Rekettye & Pozsgai, 2015). According to the estimation of UNESCO, by 2025, there will be eight million international students studying abroad (UNESCO, 2009). "Since English has become the lingua franca in almost all fields of science and professions, universities in English speaking countries, especially those of the United States and the United Kingdom, have a leading advantage" (Rekettye & Pozsgai, 2015, p. 13). This has prompted several universities in non-English speaking parts of the world to launch their programmes not only in their local languages, but in English as well.

## 1.2 Higher education in Hungary

With each passing year, Hungary is becoming increasingly multicultural. Comparing the latest census data with that of 2001, there is a significant increase in the number of foreign nationals residing in the country, whereas the number of those claiming to be Hungarian has decreased by more than a million (KSH, 2013).

Hungarian higher education has also undergone radical changes in the past twenty years. There is a significant demographic decline in the population. Based on the latest census data (KSH, 2012), the number of young people, who are the potential target of Hungarian higher education, has been decreasing significantly. In the age group of 20 and 24, their number decreased by 24% between 1980 and 2011, whilst in the age group of 25 and 29, the decrease is even higher, 31%. One explanation may be migration. Since Hungary joined the European Union in 2004, these age groups have been the most likely to migrate to more developed countries and settle there for shorter or longer periods

of time. As a result, they get into higher education in these countries, mostly the United Kingdom and Germany and not Hungary.

As a consequence, fewer Hungarian students have been admitted to Hungarian higher education since the beginning of the 21st century. At the same time institutions receive less funding from the government, while their operational costs are on the rise. Therefore, tuition fees had to be introduced in several disciplines, mainly in Business Studies, Law and Humanities, to generate income. Yet, as a side effect of this, fewer Hungarian students have enrolled for studies. The Bologna process has also had its negative impact on the number of students. Many graduates in higher education decide to finish studying after earning their Bachelor degrees and immediately pursue employment (Pozsgai et al., 2012).

To balance the growing deficit, Hungarian higher education institutions generate income by launching international programmes. These are mostly available in English to target a higher student population, however, due to the proximity of German speaking countries, such as Austria and Germany, several programmes are also offered in German (Pozsgai & Németh, 2013).

This has led to the increase in the number of international students. Their number grew from 11,187 (academic year 2001/2002) to a total of 17,112 by the academic year of 2011/2012 (Császár & Wusching, 2014). In particular, Hungarian medical education has been very popular among international students; therefore, the vast majority of this student population studies medicine at one of the four medical schools in the country.

There are significant restrictions in the number of students admitted to medical schools in several European countries, such as Norway, Germany, Spain, and as a result, Hungary is one of the target countries for medical education in Europe, as demonstrated by the table below (Table 1). As Berács, Malota and Zsótér (2010) claim, the high quality of the services provided for the students both by the universities and the towns they are located in, also contribute to the substantial increase in the number of international medical students, which was more than 34% between 2001 and 2011.

Table 1: *Number of international students at Hungarian higher education institutions in 2012-2013. Source: Komlódiné Pozsgai, 2014*

| | Name of University | Faculty | International students |
|---|---|---|---|
| 1 | Semmelweis University | Medicine | 2120 |
| 2 | University of Debrecen | Medicine | 1713 |
| 3 | University of Pécs | Medicine | 1559 |
| 4 | University of Szeged | Medicine | 966 |
| 5 | Corvinus University | Business and Economics | 847 |
| 6 | Szent István University | Veterinary | 839 |
| 7 | Eötvös Loránd University | Humanities | 511 |
| 8 | Corvinus University | Horticultural | 464 |
| 9 | Semmelweis University | Health Sciences | 387 |
| 10 | University of Debrecen | Dentistry | 375 |

## 2 Internationalising Medical Education in Hungary

The medical schools started to introduce their programmes in different languages to attract more students from all over the world. Initially, it was the Semmelweis University in Budapest that launched the first German programme in 1983, followed by the first English programme at the Medical School of the University of Pécs in 1984. Shortly thereafter, the Medical School of the University of Szeged

introduced its English programme in 1985, followed by the Medical School of the University of Debrecen in 1987 (Császár & Wusching, 2014). In 2004, twenty years following the initial launch of its English programme, the UPMS introduced its medical education in German, targeting the student population in German speaking countries, such as Germany and Austria.

### 2.1 The Medical School of the University of Pécs (UPMS)

As enrolment data indicate (Student statistics, 2016), the total number of students enrolled in September 2016 at UPMS was 3,635 students. Analysing the data further, it is suggested that the number of Hungarian students today only makes up 43% of the total student population. The majority of the students (37%) are from Germany, close to 14% come from Iran and Norway respectively, and the remainder arrive from various countries spanning the globe.

International students may enrol in elective language courses for medical purposes in Hungarian. The students study Hungarian for four to six semesters and acquire four contact hours per week. The final language examination for medical purposes in Hungarian is a prerequisite for the Internal Propaedeutics course in the fifth semester. Comprehensively, this exam was created and is required to test the international students' level of communication skills with patients admitted to clinical wardsand do so at a basic level when taking medical history and performing physical examinations. As a follow-up task, students have to present the case history of the patient in English to their supervisors; therefore, it is imperative to understand their answers. In summary, what students are expected to learn is how to use the medical terminology in sentences, how to understand authentic medical discourse, and how to communicate effectively in typical situations throughout Hungarian clinics.

## 3 The Impact of the Language of Instruction - The Case Study

The research question of the present study is whether the language of instruction (either in their mother tongue or in English) has an impact on the performance of students learning Hungarian for Medical Purposes. Three different groups were involved in the study. The language of instruction is their mother tongue for the Norwegian students in Oslo and the German programme students in Hungary. In contrast, in the English programme, English language is used as a medium of instruction, which in most cases is not the mother tongue of the students. Our hypothesis was that those groups who study Hungarian using their mother tongue as the language of instruction would perform better at the end of the first and second semester.

The language instructors used the same course book and curriculum and the students were expected to take the same standardized oral exam at the end of each semester. Additionally, we conducted an online survey as part of a longitudinal study. The longitudinal, follow-up Norwegian-Hungarian comparative study aimed at examining multiple dimensions of teaching LSP, such as the influence of the language of instruction and the learning environment, the participants' motivation and the development of their intercultural competences. The questionnaire was an online anonymous survey and respondents were asked to choose a code name so that we could follow their development. The respondents were asked to fill in the questionnaire three times, at the beginning of their studies, at the end of the first semester and finally at the end of the second semester.

When conducting online research, there are several limitations, such as low response rate or using help when giving answers to language proficiency questions. To minimize these, we asked the participants to complete the survey in class. Each researcher devoted the last 30 minutes of their ultimate class in the semester to provide time for the students to complete the survey on their mobile devices or

laptops. The researcher stayed in the classroom to prevent any form of cheating by the students. The survey was opened the night before the session and was closed straight after completing the survey. Students were encouraged to fill in the survey, explaining both the importance of the research and the advantage of being able to follow their own development in the first year of their studies. As the ultimate language session preceded their oral exam, it also served as a practice and summary of their studies. We designed a system of code names and the results of their answers had no impact on the students' final grade.

A total of 158 students agreed to take part in the study. The composition of the students participating in the survey is shown in the figure below. All of the respondents were first year students at both schools. 58% of them were female and 42% were male. The majority (62%) were aged between 15 and 20.

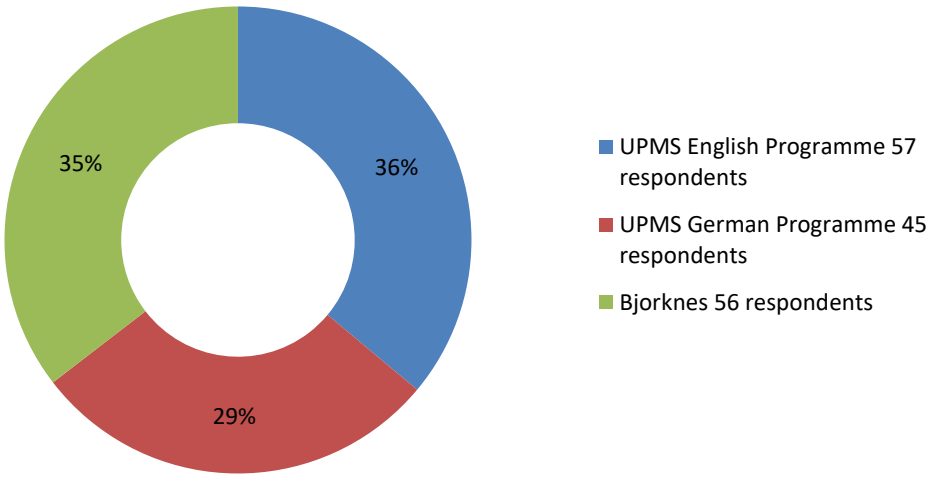


Figure 1: *The composition of the students participating in the survey*

The questionnaire contained open and closed questions, which can be divided into four categories: socio-demographic data (Section 1: 20 questions), motivational background (Section 2: 4 questions), development of their language proficiency in the form of a standardized test (Section 3: 32 questions) and questions related to their intercultural competences (Section 4: 25 questions). In the first group of questions, besides the standard socio-demographic data questions, we also mapped all the languages spoken by the students and their parents in order to get a better picture of their language background. In examining motivation, we were primarily interested in their extrinsic and intrinsic motivation. The third group of questions aimed at both tracking their progress in language learning, and comparing the respondent groups studying, either using the mother tongue or English as instruction language. Intercultural competence and the attitudes that are related to the culture of the given language play an important role in language learning. The fourth question group concerned their knowledge and attitude regarding the Hungarian culture, people and traditions and studying in a multicultural environment.

Due to the limited length of this paper, only the second group of questions is analysed regarding the development of their language proficiency in the form of a standardized test. The 32 questions were compiled based on the curriculum and the students had to answer all in writing. They had seven questions related to general greetings and some specific communicative functions, such as wishing patients a speedy recovery. The next five prompts assessed their ability to introduce themselves briefly in the target language and to initiate conversation with the patient. The respondents were also asked to formulate seven questions in Hungarian about patients' biodata and risk factors, such as smoking,

drinking alcohol and taking medications. There were four questions related to the onset, location, character and radiation of pain. Finally, the students were asked to take a brief medical history regarding nine symptoms. The symptoms were related to common complaints such as headache, cough, fever etc. The table below illustrates the results of the third survey at the end of the second semester.

Table 2: *Results of the third survey-percentage of correct responses in Section 3*

| | Bjorknes | German prog. | UPMS-English prog. |
|---|---|---|---|
| **Greetings** | 94 % | 88 % | 80 % |
| **Introduction** | 91 % | 90 % | 89 % |
| **Biodata and risk factors** | 96 % | 90 % | 91 % |
| **Pain** | 66 % | 74 % | 83 % |
| **Symptoms** | 85 % | 87 % | 82 % |

As can be seen from the table above, the three groups of students gave relatively similar correct answers in almost all sections. Interestingly, the percentage of correct answers when forming greetings was higher for the Bjorknes students. These results were unexpected, as the other two groups of respondents study Hungarian in the native language environment, whereas students from Bjorknes learn the language in Norway. The other major difference can be detected in the total scores of questions related to pain. Those students who attend the Medical School in Hungary gave correct answers in 74% and 83% in the German and English programmes respectively. Only 66% of the respondents in Norway could answer correctly. These results can be due to several factors, one of them being different teaching methods. The teachers in Hungary have more opportunities to work with skilled experts and clinicians who emphasize the importance of clinical skills.

Table 3: *The percentage of correct responses in Section 3*

| | Mother tongue-language of instruction | English –as a medium of instruction |
|---|---|---|
| **Bjorknes - Total score:** | **86.4%** | |
| **German programme - Total score:** | **85.8%** | |
| **UPMS-English programme - Total score:** | | 85% |

As Table 3 shows, there was no significant difference in the percentages of correct answers given by the three different groups of students. 86.4% of the Bjorknes and 85.8% of the German programme students who study using the mother tongue as the medium of instruction gave correct answers. The total score of correct answers was 85% for the English programme students, where English was used as a medium of instruction. To sum up, contrary to our hypothesis, there was no remarkable difference in the students' performance. The results were supported by the oral tests at the end of each semester. In conclusion, the language of instruction has no significant impact on the learning of Hungarian for Medical Purposes in the first two semesters. One explanation may be the standardised methodology applied in all three programmes, i.e. the same medical Hungarian course book is used and the outcome requirements are also the same at the two institutions.

## 4 Discussion

As part of broader research, the purpose of the present study was to examine the effects of the language of instruction on the language acquisition of Hungarian language learners in medical education. The

survey investigated the development of language skills among international students in two institutions, studying with the help of their mother tongue or using English as a medium of instruction. Findings from this study suggest that there were no significant differences in the performance of students when instructed in their mother tongue or in English. All of the acquired data can be used and will hopefully promote more effective teaching strategies in all the affected programmes in the following semesters. Future studies examining broader range of skills over a longer period of time may be beneficial and may include the longitudinal effect of language of instruction and performance on the language outcomes of LSP learners.

Today, university students commonly go abroad and enter universities where the language of instruction is often not their mother tongue. Student surveys and research regarding different cultures and language of instruction seem to be especially useful in this dynamic higher education environment.

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# Survey Research into Terminology Used by Pharmacists at Faculties of Pharmacy in Serbia

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**Abstract**

The key goal of the survey research conducted in 2015 was to evaluate the acquisition and usage of English technical terminology by testing 49 pharmacists involved in teaching and research at the faculties of pharmacy in Belgrade, Novi Sad and Niš. The survey results were taken from each faculty separately but only the cumulative results were considered in order to obtain a valuable corpus of technical terms. The questionnaire in the first part included five general questions on the acquisition and application of English technical terms. In the second part, the teachers had to add the English technical terms that they used that had either no existing, or no appropriate Serbian equivalent. The aims of the survey were to discover the level of acquisition of English technical terms in the lectures' proceedings, i.e. research, and to analyse the collected technical terms in order to identify the degree of equivalence with characteristics and possible mistranslations of the terms into the Serbian language. The survey corpus included monomorphemic and polymorphemic lexemes which are used as monosemantic or polysemantic notions. Given that many terms have polysemantic notions, many mistranslations of a technical lexeme, which should assign the appropriate technical context to a monosemantic lexeme are expected. The survey results showed that appropriate usage of English technical terms in the Serbian language required an excellent understanding of the field in which they are involved. In conclusion, pharmacists should keep a continuous review of their technical terminology, bearing in mind the importance of the English technical terms, which are dominant and commonly used in modern pharmacy.

**Key words:** pharmaceutical terminology, transferred sense, interdisciplinary context.

## 1 Introduction

The theoretical framework of this survey research was based on the following theoretical facts, which guided the analysis. In Simeon, a term is defined as "a notion or technical term, terminological item; word or group of words of specific (scientific, technical or similar) language, built (accepted or adopted, etc.) with the aim of precise interpretation of specific technical notions which nominate special objects." (as cited in Marković, 2011). In addition, Cabrè added that its "specificity is not in its formal or semantic, but in its pragmatic and communicative markers" (as cited in Marković, 2011). Bearing in mind that these characteristics are specific to technical pharmaceutical terms, this survey research was further addressed to the problem of term ambiguity or non-ambiguity, i.e. if a term has one or more notions, which depend on the technical context it is related to.

In pharmaceutical technical terminology there is also the problem of monosemy or polysemy, i.e. one term names only one notion or more notions depending on the context in which it is built and in which it is further developed.

According to Đorđević, there are six theoretical possibilities between terms and notions in science in general, but also in linguistics (as cited in Marković, 2011):

- When a term is the name for one notion it is defined as a monosemantic term.
- When a term is the name for two or more notions it is defined as a polysemantic term.
- When two or more terms are names for one scientific notion they are defined as synonymous terms.
- When two or more terms represent two or more notions they are defined as two or more disorganized systems.
- When there is a term, but there is no notion.
- When there is a notion, but there is no term.

The situation is significantly more complex when discussing two referent terminologies in two languages, where one language influences the other. At this point, the core problem is often the degree of equivalency of the technical meaning between the two languages. Accordingly, there are three possible relations between two referent notions:

- There is no equivalency in two languages when there is no referent notion in two referent terminologies.
- There is an equivalency in two languages when there are referent notions in both terminologies, i.e. their technical meanings correspond to a high extent.
- There is a partial equivalency in two languages when there are referent terms, i.e. systems of terms in both languages, but the system of full equivalency cannot be established between particular terms. This relation is extremely common and it happens when, in one language, a familiar term already exists and, in another language, the notion or the object are not familiar enough so the appropriate term does not exist. Often, in this case, either the original term is taken from the receiving language or an unterminologized word is taken. This approach is extremely important because, as will be discussed later, it will be perceived in relation to the problem of equivalency and borrowing of terms within pharmaceutical terminology.

In addition, the structure of pharmaceutical technical language and the main characteristics of it have to be taken into account in the light of this survey research. According to Cabrè, the study of technical terminology began in the first part of the XX century, i.e. 1930s (as cited in Marković, 2011). Based on a diachronic and a synchronic analysis of the development of pharmaceutical terminology (Kerničan, 2016) it is worth mentioning that the early technical language, which was used until 1945, involved the technical terms from classic medical and chemical sciences, which were mainly of Latin origin. On the other hand, the modern technical language, which was used after 1945, already felt the

growing presence of English technical language in more professional fields. According to this analysis, modern pharmaceutical technical terminology can be divided into the following categories:

1. Basic pharmaceutical terminology derived from classic medical sciences,
2. Clinical terminology that combines medical terminology and the social aspects of its application.

The terminology of social pharmacy is the most complex segment, because it combines basic, clinical and social ramifications for pharmaceutical care. The basic terminology today is still based on technical terms which are used in the field of classic medicine, where most of the terms have been taken from the Latin language, with slight phonemic and morphemic modifications. Clinical terminology is partly based on the medical terminology of Latin origin and there is a growing presence of the technical terms adopted from the English language that are related to the social implications of clinical pharmacy (Kerničan, 2016). Their structure shows that these terms are monomorphemic or polymorphemic lexemes which are mainly polysemantic notions. The technical meaning of these guidelines is determined by the field in which they are used and the professionals using them. The terminology used in social pharmacy has a greater number of polymorphemic terms which are polysemantic notions, whose technical meaning can be also determined based on the knowledge of the field in which they are used (ex. *management* > *disease management, risk management, bulk* > *bulk drug; drug, channel* > *drug channelling*).

The problem of adoption and understanding of pharmaceutical technical language is accompanied by the development of pharmaceutical sciences in the modern period. The growing presence of English technical terms used in social pharmacy may be reasonable bearing in mind that social pharmacy as an interdisciplinary science has been continuously developed since the 1980s with the tendency to involve more social sciences. On the other hand, English technical terms used in chemical sciences have been increasingly prevalent in pharmaceutical sciences in Serbia since the early 1960s. This arises from two historical arguments (Blanc, 1956), the nomenclature of drugs, which was standardised in 1949 by the WHO Experts Committee on Drugs and the usage of the English language, which was introduced into National Pharmacopoeia in 1950. Until the 1960s, Serbian technical terms used in pharmacy mainly included the names of plants, substances and natural remedies, which were used in treating disorders and mild symptoms of diseases. Taking into account all these arguments, the dominance of the English technical terms in Serbian pharmaceutical terminology is to be expected.

On the basis of these facts, pharmaceutical technical language and its specifics can be further investigated.

## 2 Methods and Objectives

The survey carried out in the period March-May 2015 was addressed at pharmacists involved in teaching and research at the faculties of pharmacy in Belgrade, Novi Sad and Niš. Forty-nine examinees took part in the survey, i.e. 31 examinees from the Faculty of Pharmacy – University of Belgrade, 13 examinees from the Faculty of Medicine (Department of Pharmacy) at the University of Niš and 5 examinees from the Faculty of Pharmacy - University Business Academy in Novi Sad. The methodological approach included separate comparative analyses of the results given by each faculty and a comparative analysis of the cumulative results given by all the faculties. In this paper, only the cumulative results were considered. The separate analyses were not taken into account because only the cumulative results are valuable for a broad insight into the critical corpus which cumulatively represents most of the disciplines at the faculties of pharmacy in Serbia.

The multiple-choice questionnaire used in the survey included seven questions. In the first part, it included five general questions regarding the acquisition and application of the technical terminology in their teaching and research, and in the second part, it included two questions intended to have an insight into the terms without appropriate Serbian equivalents or with no Serbian equivalents. The general questions 1–5 were as follows:

1. Are English technical terms involved in your lecturing proceedings?
2. Do you have the impression that your students understand the English technical terms that you introduced in the lecturing proceedings?
3. Do you recommend the study of literature in the English language as well as the obligatory literature in the Serbian language for examinations in pharmacy studies?
4. Is the technical literature and the technical dictionaries available to you to improve your understanding of English technical terms?
5. Do you use English technical terms with an incomplete translation into the Serbian language or the original English terms with no Serbian equivalent in use?

In addition to general questions, there were two questions (6–7) addressed to the teachers in order to add the English technical terms they used with no Serbian equivalent and the English technical terms they used without an appropriate or incomplete Serbian equivalent. The technical terms suggested by the lecturers had to be in line with their specialities.

The objectives of the survey may be classified as being of general matters, referring to the preceding lectures, and specific, which are strictly related to the English technical terms adopted into Serbian technical terminology.

The objectives referring to the general matters were:

- To evaluate the level of application of English technical terms in lecturing proceedings.
- To check the availability of technical instruments, i.e. specialised literature aimed at improving the appropriate acquisition of English technical terms into the Serbian language.
- To see if the majority of English technical terms were adopted into the Serbian language by calquing without a Serbian equivalent in order to evaluate the degree of teachers' understanding of English technical terms used in their technical language.

The objectives referring to the critical corpus given by the pharmacists from the faculties of pharmacy in Serbia:

- To identify phonemic, morphemic and lexical changes in the collected corpus of the English technical terms adopted into the Serbian language in order to see the level of acquisition and possible mistranslations of these terms.
- To see if the English technical terms with minimum adaptations and without Serbian equivalents prevail, when in use against Serbian pharmaceutical terms with appropriate Serbian equivalents.
- To appreciate the level of acquisition of English technical terms in basic pharmaceutical sciences compared to the level of acquisition of them in pharmaceutical sciences with a multilateral approach.
- To evaluate the level of correlation between state-of-the-art technical terms in English and domestic terms in order to improve the acquisition of English technical terms by Serbian pharmacists.

## 3 Results

The cumulative results of the survey on the questions regarding general matters were as follows:

1. Are the English technical terms involved in your lecturing proceedings?

| Survey answers | Number of the examinees | Percentage value | Total number of the examinees per answer |
|---|---|---|---|
| Yes | 14 | 28.57% | 49 |
| Partly | 32 | 65.30% | 49 |
| No | 3 | 6.12% | 49 |

2. Do you have the impression that your students understand the English technical terms that you introduced in the lecturing proceedings?

| Survey answers | Number of the examinees | Percentage value | Total number of the examinees per answer |
|---|---|---|---|
| Yes | 24 | 48.98% | 49 |
| Partly | 24 | 48.98% | 49 |
| No | 1 | 2.04% | 49 |

3. Do you recommend that students study literature in the English language as well as the obligatory literature in the Serbian language for examinations in pharmacy studies?

| Survey answers | Number of the examinees | Percentage value | Total number of the examinees per answer |
|---|---|---|---|
| Yes | 15 | 30.61% | 49 |
| Partly | 13 | 26.53% | 49 |
| No | 21 | 42.85% | 49 |

4. Are the technical literature and the technical dictionaries available to you to improve your understanding of the English technical terminology?

| Survey answers | Number of the examinees | Percentage value | Total number of the examinees per answer |
|---|---|---|---|
| Yes | 17 | 34.69% | 49 |
| Partly | 17 | 34.69% | 49 |
| No | 15 | 30.61% | 49 |

5. Do you use the English technical terms with an incomplete translation into the Serbian language or the original English technical terms with no Serbian equivalent in use?

| Survey answers | Number of the examinees | Percentage value | Total number of the examinees per answer |
|---|---|---|---|
| Yes | 23 | 46.93% | 49 |
| Partly | 19 | 38.77% | 49 |
| No | 7 | 14.28% | 49 |

The survey results based on the critical corpus of seventy (70) given technical terms adopted from the English into the Serbian language were as follows[2]:

1. Terms adopted without phonemic modifications and without a Serbian equivalent in use (6 out of 70 technical terms, i.e. 8.57%): *inlet/inlet (Medical Biochemistry), outlet/outlet (Medical Biochemistry), split/split (Medical Biochemistry), bias/bias (Analytical Chemistry), output/output (Pharmaceutical Marketing, Medical Biochemistry), SRE - Sterol Regulatory Elements / SRE (Medical Biochemistry).*
2. Terms adopted with phonemic modifications into the Serbian language and without a Serbian equivalent in use (26 out of 70 technical terms, i.e. 37.14%): *chromatographic run/hromatografik ran (Pharmacognosy), pro-drug/prodrag (Pharmacognosy), mode/mod (Pharmacognosy), vial/fijola (Medical Biochemistry), swing-out rotor/sving-aut rotor (Physical Chemistry), end-capped/end-kapt (Pharmacognosy), blank plasma/blenk plazma (Medical Biochemistry), over-winding of DNA strand/ overvajding DNK strend (Medical Biochemistry), real-time PCR (Medical Biochemistry) Ependorfica/Ependorfika (Medical Biochemistry), vortex/vorteks (Medical Biochemistry), score/skor (Pharmacognosy), descriptor/descriptor (Pharmacognosy), performance/performansa (Pharmacognosy), outsourcing/ autsorsing (Pharmaceutical Technology), fitting/fiting (Pharmacognosy), downfield/daunfild (Organic Chemistry), upfield/apfild (Organic Chemistry), medication review/medikejšn rivju (Social Pharmacy), biofeedback/biofidbek (Social Pharmacy), outcome/autkam (Social Pharmacy), responsive elements/ responsiv elemenc (Medical Biochemistry), bone turnover/boun turnover (Statistics in Pharmacy),* etc.
3. Terms adopted with phonemic and morphemic modifications into the Serbian language, and without Serbian equivalents in use (7 out of 70 technical terms, i.e. 10.00%): *compliance/komplijansa (Social Pharmacy), diet/dijeta (Bromatology), dietetic/dijetetični (Bromatology), nociceptive/ nociceptivni (Pharmacognosy, Pathology), pull/pulovanje (Medical Biochemistry), docking/dokiranje (Pharmacognosy), fitting/fiting (Pharmacognosy).*
4. Terms adopted with phonemic and morphemic modifications, and with a full or an incomplete translation into the Serbian language (15 out of 70 technical terms i.e. 21.42%): *up-regulation of genes/up-regulacija gena* or *ushodna regulacija gena, down-regulation of genes/daun-regulacija gena* or *nishodna regulacija gena (Medical Biochemistry), ion-selective electrode/jon selektivna elektroda (Physical Chemistry)*, *ATP binding proteins/ATP vezujući proteini (Medical Biochemistry)*, *stripping voltammetry/striping voltametrija* or *voltametrija s obogaćivanjem (Physical Chemistry)*, *headspace technique/hedspejs tehnika (Pharmacognosy)*, *bone remodeling/remodelovanje kosti (Physiology)*, *jumping genes/džamping geni (Microbiology, Immunology, Immunochemistry)*, *depot effect/depo efekat (Pharmacognosy)*, *scavenger receptors/skavendžer receptori (Medical Biochemistry)*, *recovery value/rikaveri vrednost (Medical Biochemistry), sink conditions/sink uslovi (Medical Biochemistry, Pharmaceutical Technology), blot analysis/blot analiza (Immunochemistry), orphan drug/orfan lek (Pharmacotherapy),* etc.
5. Terms adopted by an incomplete translation or a mistranslation into the Serbian language (7 out of 70 technical terms, i.e. 10.00%): *medication safety/sigurnost leka, medication error/medicinska greška, concordance/saglasnost (Social Pharmacy), blotting paper/upijajući papir (Microbiology, Immunology), disease management/upravljanje bolešću, menadžment bolesti (Social Pharmacy, Pharmaceutical Management), pain management/upravljanje bolom, menadžment bola (Social Pharmacy, Pharmaceutical Management), risk management/menadžment rizikom, upravljanje rizikom u politici primene zdravstvene zaštite (Social Pharmacy, Pharmaceutical Management).*
6. Terms adopted by paraphrasing into the Serbian language and without a Serbian equivalent in use (9 out of 70 technical terms, i.e. 12.85%): *by-product/nus-produkt (Pharmaceutical Technology), in-patient/hospitalizovani pacijent (Social Pharmacy), out-patient/pacijent u primarnoj zdravstvenoj zaštiti odnosno van bolnice (Pharmacotherapy), first-line drug/ lek koji je prioritetan u određenoj terapiji (Pharmacotherapy), second-line drug/ lek koji se koristi kao zamena za lek koji je prioritetan u određenoj terapiji (Pharmacotherapy), break-down area/posude ili kontejneri radiološkog, citostatičnog ili drugog leka ili produkta sa zaostalim ili nezaostalim proizvodom sa kojim se mora posebno postupati (Toxicology, Social Pharmacy, Pharmacovigilance), etc.*

### 3.1 Interpretation of the results

Based on the survey results for the first question, it is shown that there is an increasing practice of applying English technical terms in the lecturing proceedings in Serbia. This fact is in logical correlation with the fact that pharmacy students at an equal level understand (48.9%) or partly understand (48.9%) English technical terms (the second question). Furthermore, this is supported by the fact that 42.85% of the teachers do not recommend technical literature in English as obligatory, as well as by the statements that 30.61% of teachers recommend it and that 26.53% of them partly recommend it. In addition, this means that, according to the cumulative results, English technical literature is partly recommended (the third question). The partial availability of necessary English technical dictionaries and specialized literature, due to the responses to the fourth question, also indicates the need for technical instruments for acquiring English technical terminology both by the teachers and by the students (with reference to the third question). This also explains the results of the last general question, i.e. that the calquing of English technical terms by the majority of teachers is shown in the survey as an increasing practice.

In the second part of the survey which includes the critical corpus, there are six groups of terms. The terms in the first group adopted into the Serbian language without phonemic, morphemic or lexical changes are structurally defined as monomorphemic lexemes *(inlet/inlet, outlet/outlet, output/output, split/split, bias/bias)*. Almost all the lexemes are used in Medical Biochemistry, except for the lexeme *output* which is used in Pharmaceutical Marketing. Only a few of them such as *bias* and *output* are used as polysemantic notions in the appropriate context of Medical Biochemistry and Pharmaceutical Marketing. The others such *as inlet, outlet* and *split* are used with their original signification as monosemantic notions, but because they are used as specific segments or parts of the technical procedures or devices they are considered technical terms. The abbreviation *SRE - Sterol Regulatory Elements/ SRE* was also adopted into the Serbian language without appropriate translation and modifications. It is always used in the Serbian technical language as an abbreviation with its original signification as a monosemantic notion.

The second group of terms, including those adopted with phonemic changes into the Serbian language, are structurally defined as monomorphemic and polymorphemic lexemes (*upfield/apfild, downfield/daunfild, outsourcing/autsorsing, run/ran, descriptor/deskriptor, performance/performans, score/skor, vortex/vorteks, biofeedback/biofidbek, chromatographic run/hromatografik ran,* etc.). The monomorphemic and polymorphemic lexemes such as *upfield, downfield, outsourcing, run, descriptor, performance, score, vortex, biofeedback* are used in the pharmaceutical technical language as polysemantic notions, which are interpreted in a technical context based on the professional knowledge of the users. The polymorphemic lexemes such as *chromatographic run, swing-out rotor, real-time PCR, end-capped, blank plasma, over-winding of DNA strand* are also used as polysemantic notions but it is worth mentioning that they include one lexeme which is, technically a monosemantic notion, and the other one or two lexemes which are polysemantic notions in a general sense. The technical interpretation of these polymorphemic lexemes will be determined by the technical lexeme, which will add the technical meaning to the lexeme in a general sense. The term *Ependorfica*, denoting a specific, curved laboratory container, is the only term which originates from the name of a company Eppendorf. When the technical meaning of these terms was analysed, it was seen that the technical context in some of the monomorphemic and polymorphemic terms implied a broad, transferred sense when used in the disciplines with the multilateral approach such as social pharmacy (ex. *medication review*, *biofeedback*). Thus, many misinterpretations are expected in the technical language of these branches, especially when the users are non-native English speakers. The same is also true when modern pharmaceutical strategies, i.e. state-of-the-art technical terms were not implemented in the Serbian pharmacy according to the modern development of pharmacy.

The terms from the third group adopted from the English into the Serbian language with phonemic and morphemic modifications and with no appropriate Serbian technical equivalents are monomorphemic lexemes: *compliance/komplijansa, diet/dijeta, dietetic/dijetetski, nociceptive/nociceptivni, fitting/fitovanje, docking/dokiranje.* The terms *nociceptive* and *dietetic* are monosemantic notions, while the terms *pull/pullovanje, docking/dokiranje, fitting/fiting, compliance/komplijansa* are polysemantic notions with a technical meaning, which is determined by the professional knowledge of the users and the scientific discipline they belong to. The terms in this group are mainly used in basic pharmaceutical sciences. In spite of this, the terms such as *pull/pullovanje, docking/dokiranje, fitting/fiting, compliance/komplijansa* as polymorphemic notions have a broader, transferred sense, especially the term *compliance* with a multilateral context when used in social pharmacy.

The fourth group of given pharmaceutical terms includes polymorphemic lexemes with morphemic or phonemic modifications, which have an incomplete translation into the Serbian language (*jumping genes/džamping geni, recovery value /rikaveri vrednost, sink conditions/sink uslovi, depot effect/depo efekat, scavenger receptor/skavendžer receptor*). These polymorphemic lexemes include one or two lexemes which are polysemantic notions adopted into the Serbian language with phonemic changes and one lexeme which is used in pharmacy as a monosemantic notion. The same principle of adoption was applied in the polymorphemic lexemes that have equivalents in the Serbian language (*up-regulation of genes/up-regulacija gena* or *ushodna regulacija gena, down-regulation of genes/daun-regulacija gena* or *nishodna regulacija gena,* etc). In the terms including both lexemes which are monosemantic notions, the technical meaning will be assigned to by the users who are familiar with the technical meaning (*recovery value/rikaveri vrednost, sink conditions/sink uslovi, depot effect/depo efekat*).

Both the fifth and the sixth groups of terms require very good technical knowledge due to the fact that these terms are mostly used in the pharmaceutical sciences with a multilateral approach. The fifth group of pharmaceutical terms (*medication safety/sigurnost leka, medication error/medicinska greška, concordance/saglasnost, blotting paper/upijajući papir*) are polymorphemic lexemes in which one or both of the lexemes are polysemantic notions that are used in a broader sense across many disciplines. We have identified that the most common term in pharmacy with not only medical, but also social implications is *management*. It has a very broad application in social pharmacy according to the discipline in which it is commonly used *(pain management, disease management and risk management)*.

The sixth group of terms adopted into Serbian by paraphrasing are polymorphemic lexemes comprising two or three lexemes. There are polymorphemic technical terms in which only one lexeme (out of two or three lexemes) is used in pharmacy as a monosemantic notion *(second-line drug)* and the polymorphemic technical terms in which all the lexemes are used in pharmacy as polysemantic notions *(break-down area)*. The analysis showed that the majority of the terms identified as polymorphemic lexemes are not always technically determined by the monosemantic lexeme included, whereas the polymorphemic lexemes including all the lexemes used as polysemantic notions with transferred sense, will be technically determined only by the professionals using them. In addition, a person who is not familiar with the appropriate context would not understand the technical meaning of these terms because many of the included lexemes are prepositions, phrasal verbs, numerals or nouns which may be easily misinterpreted *(out-patient/pacijent u primarnoj zdravstvenoj zaštiti, second-line drug/zamena za lek, by-product/nus produkt, in-patient/hospitalizovani pacijent, break-down area/posude ili kontejneri radiološkog, citostatičnog ili drugog leka (produkta) sa zaostalim ili nezaostalim proizvodom sa kojim se mora posebno postupati, etc.)*. Most of these terms are used in the pharmaceutical industry, pharmaceutical technology, pharmaceutical management and other sciences where the social and medical aspects of modern pharmacy and good pharmacy practice are interrelated in primary, secondary and tertiary pharmaceutical health care. Accordingly, to paraphrase them is, for the majority of the terms, expected and indispensable in their determination.

## 4 Discussion

The survey analysis of given technical terms leads to several conclusions:

Although pharmacists from the faculties of pharmacy in Serbia apply and recommend the study of literature in English as obligatory, both students and teachers are aware of the necessity for knowledge of English technical language for further professional growth. Accordingly, pharmacists need to keep up with the latest improvements in their field. They also have to keep a continuous review of the domestic technical terminology that must be in correlation with modern working strategies in pharmacy. This will certainly lead to better understanding of the adopted English technical terms and a growing presence of domestic technical terms.

Referring to the specifics of the given terminological corpus used by the pharmacists in Serbia and the aims of the survey, there are certain additional conclusions:

English technical terms with minimum phonemic and morphemic adaptations and without Serbian equivalents prevail in the Serbian technical language of pharmacists (39 – 55.71%). Fewer given terms are adopted by a full or partial translation or by paraphrasing (31 – 44.28%).

The technical language of Serbian pharmacists is rich in English technical terms in medical and chemical sciences, especially in pharmaceutical chemistry, medical biochemistry, as well as in few terms in pharmacognosy (51 terms – 72.85%). Even fewer, though still a significant number of given terms, are used in pharmaceutical sciences with a broad multilateral approach (19 terms – 27.14%).

The English monomorphemic and polymorphemic lexemes are used in pharmacy in general as polysemantic notions, which often result in mistranslations into the Serbian language if the users are not familiar with them. Thus, for pharmacists it is often more convenient to use the original English terms. It is also easier to communicate to foreigners in English, because they are mostly in the position of supervisors in the Serbian pharmaceutical companies, and English technical language is used in all strategic aspects of the professional practice.

This survey is of importance for the further research yet to be done in this field. The given results emphasize the necessity of being familiar with the technical terminology that must be harmonized with the latest strategic developments in pharmacy. This is crucial for both Serbian scientists and for all the scientists working in developing countries.

This study of critical corpus certainly gives contributions to the LSP study mainly in the specifics of polymorphemic lexemes used in the pharmacists' technical language as well as in the misinterpretations of the polysemantic notions. This topic is very challenging for those doing further analyses of the technical critical corpuses in some neighboring countries with Slavic origin. The given corpuses should be characterized in their specifics and identified in their similarities in mistranslations. The benefits of this kind of research would, undoubtedly, be of enormous importance for both the scientists and the linguists from the region.

There are certainly some limitations identified in the survey. First of all, these are shown in a lesser number of examinees from some of the faculties involved in the survey, whose issues were not possible to fully grasp due to technical limitations.

Accordingly, it would be significant for future research to involve more professionals from the pharmaceutical industry and pharmaceutical technology industry, which are closely connected with foreign collaborators dealing with pharmaceutical management and marketing. The insight into the specifics of the pharmacists' technical terminology would thereby be enhanced with new state-of-the-art technical terms used by professionals involved in all aspects of the multilateral pharmaceutical approach.

Taking into account the fact that all the participants in the survey were from educational institutions, this critical corpus certainly has limitations in the lack of some technical terms which are commonly used in multilateral pharmaceutical branches in every day practice.

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