CORPUS-AIDED INSTRUCTION AND ASSESSMENT IN ENGLISH FOR PHARMACY

Ilina Doykova, MU-Varna

Abstract

The paper will explore the integration of text analysis tools into the ESP auditorium for developing communicative competence skills. Incorporating corpus linguistic tools into the teaching and assessment of English for students of pharmacy requires the compilation of a specialized corpus and the design of corpus-based tasks, as well as selection of authentic texts in order to focus on frequent grammatical, syntactic and lexical patterns, characteristic of this specialized language. The application of corpus linguistic tools to the design of teaching materials was necessitated by the learners' needs and the time constraints of the course. From the teacher's perspective, the purpose-built specialized corpus was extremely useful, as teaching resources in the domain of English for Pharmacy are scarce. The aim was to improve accuracy of language usage based on frequency of occurrence of lexical items and collocations. Identifying typical language samples from concordance lines allowed for a quick and efficient acquisition of core vocabulary, as well as proper syntactic and grammatical patterns. This approach minimized the ESP teaching based on personal experience and preference and allowed for an objective assessment. By generating corpus-based resources for the digital classroom, the teacher becomes content creator and instructor about the strong specificity of the ESP course.

Key words: *corpus-based approach, focused instruction, acquisition of specialized vocabulary*

Introduction

The purpose of this paper is to highlight the role of collecting and building specialized language corpora that reflect a certain type of professional communication and their direct application in language education. The application of text analysis tools for ESP purposes (in our case English for pharmacists) is justified by the need to design effective teaching materials and focus students' attention to typical patterns of language use, core vocabulary, lexical, grammatical and register features. A major question which remains unsolved in the domain of specialized language training is the scope of academic and scientific vocabulary to be included at different proficiency levels (B1, B2, C1) for the development of both receptive and productive skills, e.g. specialist language for conducting certain types of professional interactions or documentation writing.
The significance of corpora in language education has long been established but research in this field mainly centers around extracting concordance sentences, compiling high frequency word lists, and finding lexical and grammatical patterns. At present, the types of specialized language corpora are either general or limited to several subject domains such as academic English, English for law, politics, economics, and business. Academic word lists such as the academic word list (AWL), established by Coxhead (2000) have a rather low coverage of scientific vocabulary (9,1%) in the field of healthcare. Other available wordlists such as the medical academic word list (MAWL), based on open access research articles from *Science Direct Online* (Wang, Liang and Ge, 2008) cover numerous medical fields and hence, are broad enough.

As we questioned the effectiveness of academic word lists, our attempt was to construct a more representative word and phrase list from a discipline-specific corpus (English for Pharmacy Corpus), using the established Pharmacy Academic Word List (PAWL) as a reference corpus. The PAWL (Heidari, F. Jalilifar, A. and Salimi, A., 2020) is based on research and review articles in the fields of pharmacology, toxicology and pharmaceutical science, containing the most frequent 750 word families. The intention of the authors is to facilitate non-native researchers and postgraduate students when publishing in English. The findings of such investigations confirm the necessity to compile domain-specific word lists to address the needs of non-native speakers. Another researcher who explores English for pharmacists is Grabowski (2015), who collected patient information leaflets, product characteristics, clinical trial protocols, and pharmacy textbooks to establish frequent keywords and lexical bundles in this professional language. However, the purpose of our study is rather different as we aim to establish the language variety and the language functions used in the content of the specialized textbooks of English for Pharmacy. In practice, it is the textbook, the assessment tasks, and/or the teacher preferences and expertise that influence what is taught in the language classroom.

Corpus compilation

For our corpus compilation (English for Pharmacy Corpus) we collected authentic journal articles from *The Pharmaceutical Journal*, *Pharmacy Times* and texts from seven published textbooks for the range of collocations, phraseological and multiterm units, included in the teaching process. Two linguistic analysis tools were used - WordSmith Tool (Scott, 2020) and Sketch Engine (Kilgarriff, A., Baisa, V., Bušta, J., Jakubíček, M., Kovář, V., Michelfeit, J. and Suchomel, V., 2014) with their main functions - concordance, keywords, single and multiterm units, word profile, patterns of lexical use, and clusters. The corpus files were created from the following sources:

- *English for Pharmacy and Medical Bioanalytics* (2018) for students in bachelor's and master's programs of Pharmacy, and professionals at B2 level of foreign language proficiency;
- *English for Pharmacy (2012)*, designed for students at B1 and B2 levels of language competence;
- *Pharmacy Consultation Guide (2019),* based on real communicative situations in the pharmacy;
- *English for Pharmacy Writing and Oral Communication (2009)*;
- *Communication Skills in Pharmacy Practice, A Practical Guide for Students and Practitioners* (2020) with real case studies such as interviewing patients, interacting with children, and collaborating with healthcare providers;
- *Manual of Pharmacology - English Courses* (2013).

Considerable experience in the field of both foreign language training for medical purposes and e-learning has been accumulated at MU-Varna during the last 10 years. In the specialized

language course English for Pharmacy, the instructors provide teaching content from selected materials for classroom and extracurricular work, accompanying progress and final tests as well as lexical and grammatical tasks in the Blackboard platform (from 2017/2018 academic year onwards). The teaching span is spread over two semesters with a total of 60 hours. In order to make optimal use of the instruction time, a significant amount of resources has been developed for the Blackboard platform in several directions: a) electronic archive with types of tasks for assessment; b) general and academic grammar resources with graded exercises for self-study (levels B1, B2, C1); c) communicative tasks accompanying each unit of the textbook to further develop productive skills (speaking and writing); d) adapted resources to develop receptive skills (reading and listening); e) a collection of sample essays and students' presentations for reference purposes. The effectiveness of every semester assessment is established by analysis of test results and an end-of-year student survey. The level of difficulty of the tests is consistent with the curriculum requirements as consideration is given to students' accumulated knowledge and progress during the language course. This approach guarantees relevant feedback, an accurate evaluation of students' progress, continuous update of the course content as well as its flexibility according to the students' level of language competency. It accesses authentic linguistic data and methodologically facilitates the ESP principle of learner-centeredness.

Specialized vocabulary load

Using a word productively requires learners to know the form of the word and its grammatical behaviour. In addition, they must be aware of the constraints on word usage due to register, combinatory profile, frequency and connotation. From all aspects of word knowledge collocations are the least practiced (e.g. *administer* + *injection, medication, drug, dose, dosage; externally, orally, intravenously; to, in, by, through, via*).

[Fig. 1 NEAR HERE]

In the corpus-based approach priority is given to highly frequent words, which allowed us to predict and search for representative texts for inclusion in the assessment tasks. Based on the quantitative approach, we established the English for pharmacy word list containing 2000 lemmas, exclusive of the 2000 most frequent words of English as per the New General Service List (Browne, 2021). The minimum frequency of a word in our wordlist was set to 30 (Fig. 2).

[Fig. 2 NEAR HERE]

To effectively test vocabulary that draws on a specialized language, taught in an ESP course, we relied on a corpus highlighter as a tool for finding suitable texts for inclusion in various assessment tasks. A short text in the field of pharmacy was randomly selected for illustrative purposes here (Fig. 3).

[Fig. 3 NEAR HERE]

Hence, the PAWL coverage of the above passage is 9.6%, while the AWL coverage is only 6,3% in a text of 127 words. Texts with the highest density of specialized lexical entries, recurrent part-of-speech entries (adjectives, nouns, verbs, adverbs), and lexical patterns (multiword terms and

collocations) were incorporated into classroom teaching and assessment (Ma, Q., Tang, J. and Lin, S., 2021).

A. Key adjectives, EP Corpus

lightheaded, irritable, sublingual, congestive, intramuscular, degenerative, stinging, subcutaneous, persistent, contaminated, sufficient, soluble, prescribed, herbal, inflammatory, stiff, fungal, adverse, over-the-counter, cardiac, brittle, nutritional, malignant, involuntary, innate, hormonal, whooping, obese, mucous.

B. Key nouns, EP corpus

suppository, digitalis, incontinence, constipation, palpitation, tenderness, dizziness, fatigue, nosebleed, heartburn, ulcer, drowsiness, cramp, stiffness, thrush, cystitis, measles, hepatitis, insomnia, oedema, jaundice, halitosis, cirrhosis, bronchitis, dyspnoea, nebulizer, inhaler, diuretic, bronchodilator, laxative, expectorant, lozenge, capsule, decongestant, dosage, mucus, sputum, clot, flatulence, relapse, contraindication, irritation, infection, bandage.

C. Key verbs, EP Corpus

cause, affect, administer, complain, occur, prevent, suffer, indicate, recommend, spread, involve, require, dispense, transmit, maintain, determine, trigger, irritate, present, vomit, dissolve, impair, interfere, constipate, alleviate, recover, deteriorate, conduct, ingest, rinse, exacerbate, excrete, obstruct, congest, restrict, sterilize, soothe, numb, aggravate, substitute, estimate, dispose, enhance, abuse, cleanse, gargle, wheeze, belch, bloat, tingle, expectorate.

D. Terminological entries, EP Corpus

administer medication, medication history, medical condition, prescription medication, respond to treatment, tolerate pain, relieve pain, avoid alcohol consumption, suppress cough, tolerate a drug, cause nausea, complications such as, perform an experiment, alternative treatment, adverse effects, measuring spoonful, renal insufficiency, chemical compound, etc.

E. Collocations, EP Corpus

be able to + Inf.	be difficult to + Inf.
be un/suitable for	be responsible for
be susceptible to + Inf.	be similar to + N/Ving/CLwh
be available with/in/to + Inf.	be efficient in
be allergic	be common
be useful in/for/when	be contagious
be necessary for/to/when	be present

F. Recurrent patterns, EP Corpus

[Fig. 4 HERE]

Assessment

Minimum two progress test versions and two final test versions are created by the instructors per academic year. The tasks are designed for two levels of language difficulty (B1 and B2) and the tests are graded (versions A and B) to suit the needs of all students in the mixed level groups. Task types are developed with focus on key words, clusters, and collocations as core lexical entries in Pharmacy texts. All test tasks are stored in a repository bank. The task types include multiple choice, text completion (cloze tests), word order, true/false statement selection, matching definitions and terms, etc. (Fig. 5). Terminological units are incorporated in the design of the following types of tasks: accurate use of keywords and terms, identification of collocations (missing parts), use of reporting verbs, labelling pictures, etc. The final test (after 60 lessons of instruction) consists of four groups of tasks. The first 2 tasks test the receptive skills of listening and reading, while the other two tasks check productive skills such as use of English and writing. Sample tasks are illustrated in Fig. 5 – 8.

[Fig. 5 NEAR HERE]
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[Fig. 8 NEAR HERE]

Conclusions

Foreign language teaching for medical purposes reflects the rapid changes taking place in professional communication in healthcare. Alongside with the focused instruction, we bring authenticity, reliability, objectivity and improved quality in the evaluation process.

We believe that building a corpus for any ESP domain is justified because such professional domains are highly specific in terms of vocabulary usage and genre conventions, which cannot be acquired quickly and efficiently with traditional teaching approaches. A specialized corpus guarantees the veracity of language materials, incorporated in the teaching content, thus providing consistency of the instructional process with all aspects of student assessment.

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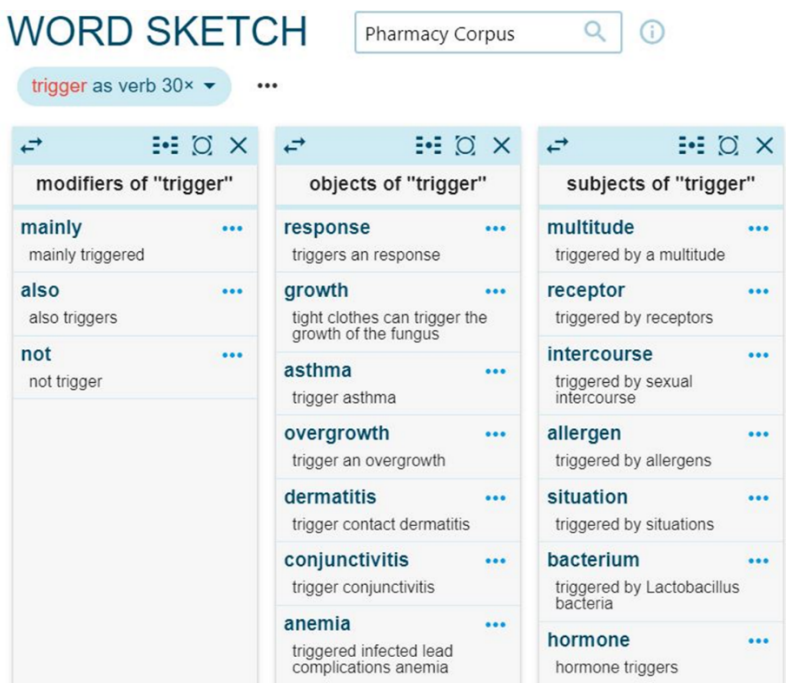

Fig. 1. Combinatory profile of v. *trigger,* Sketch engine

File Edit View Compute Settings Windows Help

N	Word	Freq.	%	Texts	%	Dispersion	Lemmas
1	PATIENT	2 212	0,84%	n/a	n/a	n/a	pa...4
2	PHARMACIST	1 732	0,66%	n/a	n/a	n/a	ph...3
3	TAKE	959	0,37%	n/a	n/a	n/a	tak...26
4	PERSON	810	0,31%	n/a	n/a	n/a	pe...17
5	DRUG	803	0,31%	n/a	n/a	n/a	dru...22
6	USED	741	0,28%	n/a	n/a	n/a	use...81
7	BLOOD	649	0,25%	4	100,00%	0,80	
8	DISEASE	604	0,23%	n/a	n/a	n/a	dis...80
9	CAUSE	599	0,23%	n/a	n/a	n/a	ca...6
10	BODY	583	0,22%	n/a	n/a	n/a	b...5
11	INFECTION	534	0,20%	n/a	n/a	n/a	in...49
12	DOCTOR	530	0,20%	4	100,00%	0,65	
13	TREAT	524	0,20%	n/a	n/a	n/a	tr...2
14	MEDICATION	515	0,20%	n/a	n/a	n/a	m...3
15	HEAR	481	0,18%	n/a	n/a	n/a	hear[27
16	HELP	462	0,18%	n/a	n/a	n/a	hel...66
17	SYSTEM	440	0,17%	n/a	n/a	n/a	sy...79
18	GET	411	0,16%	n/a	n/a	n/a	get[276
19	PAIN	408	0,16%	4	100,00%	0,78	
20	NEED	394	0,15%	n/a	n/a	n/a	nee...58

Fig. 2. Lemmatized keyword list, EPCorpus

Topical skin preparations are designed for application to the skin and other surface tissues of the body. Preservatives are usually included to reduce the growth of bacteria. The most commonly used types of skin preparations are: creams, ointments and lotions.

The solutions for injections are sterile (germ-free) preparations of a drug dissolved or suspended in a liquid. Other agents such as anti-oxidants, are often added to preserve the stability of the drug or to regulate the acidity or alkalinity of the solution. Most injectable drugs used today are packaged in sterile, disposable syringes. This reduces chances of contamination. Certain drugs are still available in multi-dose vials, and a chemical bactericide is added to prevent the growth of bacteria when the needle is reinserted through the rubber seal.

Fig. 3. Specialized vocabulary in context, EP Highlighter

	Word			Word	
64	chest pain	•••	77	inflammatory disease	•••
65	cranberry juice	•••	78	vaginal yeast	•••
66	sore throat	•••	79	loss of appetite	•••
67	night sweat	•••	80	rheumatoid arthritis	•••
68	reproductive system	•••	81	lymphatic system	•••
69	nebulizer kit	•••	82	text comprehension	•••
70	hiatal hernia	•••	83	side effect	•••
71	other medication	•••	84	dry eye	•••
72	possible side effect	•••	85	dosage form	•••
73	respiratory system	•••	86	vaginal yeast infection	•••
74	pharmacy technician	•••	87	medication history	•••

Fig. 4. Multi-term units, EP Corpus

I. Listening

0:00 / 0:00

Please determine whether the following statements are true or false.

1. Painkillers is a common synonym for opioids. **True**
2. Opioids are known to block pain signals. **False**
3. Some people feel happy when taking opioids. **True**
4. Diarrhea is a side effect of opioids. **True**
5. The regular use of opioids is likely to influence a person's tolerance. **False**

Fig. 5. Assessment of listening skills, English for Pharmacy, MU-Varna

Read the text entitled How to treat fibromyalgia and choose the correct answer – A, B, C or D – to the 10 questions below.

1. The symptoms of fibromyalgia may develop after experiencing: **b**

a. Musculoskeletal pain
b. Fatigue
c. Psychological stress
d. Localized tenderness

2. Which painkiller may be prescribed to reduce the pain in fibromyalgia? **c**

a. Pregabalin
b. Naproxen sodium
c. Gabapentin
d. Vitamin D

3. Which of the following can be an unpleasant side effect of antidepressants? **d**

a. Dizziness
b. Swelling
c. Dry mouth
d. Weight gain

4. Which of the following can be a side effect of anticonvulsants?

a. Oedema
b. Nausea
c. Loss of sexual desire
d. Muscular aches

Fig. 6. Assessment of reading skills, English for Pharmacy, MU-Varna

Read the text and fill in the gaps with one of the words or collocations:

opioid pill perished overdoses swallowing climbed painkillers drugs ingesting

The Youngest Opioid Epidemic Victims Are Toddlers

Curious toddlers find the (1) _____ in a mother's purse or accidentally dropped on the floor. Sometimes a parent fails to secure the child-resistant cap on a bottle of 2) _____ .

No matter how it happens, if a 35-pound toddler grabs just one 3) _____ , chews it and releases the full concentration of a time-released adult drug into their small bodies, death can come swiftly. These are some of the youngest victims of the nation's opioid epidemic — children under age 5 who die after 4) _____ opioids. The number of children's deaths is still small relative to the overall toll from opioids, but toddler fatalities have 5) _____ steadily over the last 10 years.

In 2000, 14 children in the U.S. under age 5 died after 6) _____ opioids. By 2015, that number climbed to 51, according to the Centers for Disease Control and Prevention. In Milwaukee County, Wisconsin, alone, four children died last year of accidental 7) _____ . Another 2-year-old 8) _____ in January.

Fig. 7. Assessment of collocations, prepositions and set phrases, English for Pharmacy, MU-Varna

Match the definitions to the terms:

D. antacids
I. antiemetics
C. antipyretics
H. antitussives
- applications
- drug action
- drug interaction
- paints
- polypharmacy
- solutions

A. The process by which two or more drugs have an effect on each other and work together
B. Thick preparations to hold ingredients next to the skin
C. The concurrent use of multiple medications by a patient
D. The way drugs influence a living organism
E. Drugs that reduce fever.
F. Drugs that suppress a cough.
G. Liquid preparations for skin application
H. Drugs that treat nausea.
I. Ingredients dissolved in water that can be used to bathe the skin
J. Drugs that relieve the symptoms of heartburn.

Fig. 8. Assessment of terminology, English for Pharmacy, MU-Varna