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Published in the Slovak Republic
European Journal of Contemporary Education
E-ISSN 2305-6746
2018, 7(1): 51-59
DOI: 10.13187/ejced.2018.1.51
www.ejournal1.com

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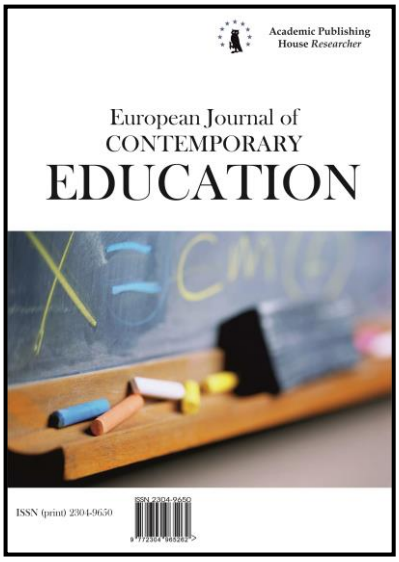

Development of Foreign Language Lexical Competence on the Basis of a Learner's Terminological Thesaurus and Dictionary

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Abstract

The article suggests a method of foreign language lexical competence development on the basis of a Learner's terminological thesaurus and dictionary of software terms which includes four main components: classification part demonstrating the inner logic of the subject area, glossary with definitions of key terms, thesaurus demonstrating logical and associative relations of the key terms, and bilingual alphabetical dictionary. The thesaurus and dictionary has an extended context part supplemented with an encyclopedic part on the main topics of the thesaurus. The stages of the development and the structure of the Thesaurus and dictionary are described. Pedagogical experiment was conducted and proved high efficiency of the method proposed.

Keywords: lexical competence, learner's thesaurus and dictionary, learner's dictionary development, structure of a learner's dictionary.

1. Introduction

Occupational mobility of a professional is impossible without knowledge of a foreign language. The proficiency in any foreign language is determined, first of all, by lexical competence as it is the lack of vocabulary and lexical errors that can lead to communicative failure and misunderstanding (Shamov, 2005; Lewis, 1993; Meara, 1996 et al.). Lexical competence is especially important for non-English-speaking IT-specialists because English is a recognized language of communication and documentation in this area, and certification exams can be taken only in English. Besides, IT-specialists often work as freelancers and take part in English-speaking professional communities. To form lexical competence in an occupational field, it is necessary to

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select key terminology of this field and to determine the most important semantic relations between key terms as well as between the key terms and other words of the language.

One of the first linguists, who tried to describe what it means to 'know a word', was J. Richards (Richards, 1976). According to him, knowing a word isn't limited to the knowledge of its meanings and word forms, its derivatives, but also includes the knowledge of its syntactic behavior and the net of associations of the word with other words. Describing lexical knowledge, P. Meara (Meara, 1996) emphasizes such aspects as vocabulary size, the number of lexical units which a person knows, and vocabulary organization, how these words are connected to each other. He notes that the bigger the vocabulary size is, the higher the significance of the system of relations and associations between words.

The importance of associative relationships is also emphasized in scientific papers on psychology (I.A. Zimnyaya), psycholinguistics (A.A. Leontiev, A.A. Zalevskaya), linguistics (V.A. Zvegintsev, Yu.N. Karaulov), and foreign language teaching methodology (E.I. Passov, T.S. Serova). It is emphasized that the net of relations among words cannot be transferred from the native language, but must be formed anew. To learn a foreign word, it is necessary to acquire the potential system of its semantic relations (Serova, 1989). Lexical competence development should therefore be based on revealing and determining these relations.

Thus, the development of lexical competence as *knowledge of, and ability to use, the vocabulary of a language*, consisting *of lexical and grammatical elements* (Common European Framework of Reference for Languages) (Common European Framework...: 110) is based on the development of conceptual and categorical system of the related subject area, and hence, the acquisition of its terminology and the system of paradigmatic and syntagmatic relations of its key terms. The development of the occupational foreign language lexical competence should be carried out on the basis of a learner's dictionary which presents the terminology of a subject area and shows semantic relations of its key terms, in other words, a thesaurus (Linguistic Encyclopedic Dictionary, 1990: 506-507) and dictionary. To develop such a dictionary, it is necessary to analyze the subject area, to sort out the relations of its key terms, and to determine their most important paradigmatic and syntagmatic relations.

2. Literature review

The first '*Thesaurus of English Words and Phrases*', in which vocabulary of the English language was classified in groups, was created by P.M. Roget and first published in 1952. Since then it has been revised many times and enriched with new words and connotations. In the XXth century, thesaurus became an information retrieval tool. Unification of thesauri took place in the context of coordination of information retrieval systems. In turn, information retrieval system development has contributed to increased development of specialized thesauri.

According to Yu.N. Karaulov, a thesaurus must have four potential entries (Karaulov, 1981: 148-166). The systematic part of a thesaurus includes descriptors (key words which have their descriptive entries) and non-descriptors (words which do not have any descriptive entries and which are subordinate to the main descriptor). This part represents the connection between a concept and a sign. The classification scheme of a thesaurus reproduces the structure of a particular subject area and provides the transition between words, from a descriptor to the descriptive unit, and from this unit to an adjacent subject area and vice versa. This part represents the connection between concepts. The third thesaurus entry shows the connection between the sign and the concept. The words are listed in alphabetical order with their address in the conceptual fields. The fourth part is permutation index which includes all the words of the thesaurus in alphabetical order. It is used for facilitated and accelerated search of terms and their combinations and demonstrates the connection between signs.

There are 13 lexicographic parameters which determine the ideographic character of a dictionary (Tabanakova, 2001: 69-70), among them are synonymy, antonymy, including semantic fields and thematic groups in the dictionary as they show system relations between concepts. But the main parameter is the availability of different "entries in the dictionary" as it reflects the method of vocabulary organization. The most famous monolingual (Longman Dictionary of Contemporary English; Oxford Living Dictionaries; Oxford Advanced Learner's Dictionary; Macmillan Dictionary; Dictionary; Cambridge Dictionaries; The free dictionary; Collins Dictionary) and the most popular in Russia multilingual online dictionaries (ABBY Lingvo; Multitran) contain

semantic relations (synonyms, derivatives, associative relations) as an integral component, which brings thesauri and dictionaries closer.

Thesauri are widely used in learning process, in particular, in foreign language teaching (Arkhipova, 2009; Chainikova, 2014; Shishkina, 1992 et al.). They make it possible to represent logical-conceptual and semantic relations of a terminological system (Yu.N. Karaulov, T.S. Serova, V.D. Tabanakova et al.). Due to the fact that the thesaurus contains the core of special knowledge and is a concentrated expression of an academic discipline, it promotes the mastering of conceptual and terminological system of the field studied and the development of student's professional thinking.

Learner's bilingual thesauri have been developed within Perm methodological school. The thesaurus is considered to be a method of arranging, introducing and consolidating knowledge of a subject area as a system of lexical means in their interconnections and relations (T.S. Serova, E.I. Arkhipova, L. P. Shishkina, G. R. Chainikova et al.). A terminological thesaurus built in this way is based on semantic relations of words which are arranged as a multitier structure, reflecting extralinguistic reality. Its unit is a semantic field, not a word (Dubichinsky, 1998: 79). This allows us to build the system of logical relations and increase the learning effect. The purpose of a thesaurus development is to systematically arrange the concepts and the vocabulary of an occupational field, to represent the most important paradigmatic and syntagmatic relations of key terms. The main purpose of such a dictionary is to be "a tool for selecting a word" (Yu.N. Karaulov), and its application in the learning process should result in the development of the foreign language professional mental lexicon.

The thesaurus and dictionary developed within Perm methodological school includes four components.

1. Classification part. It consists of charts which demonstrate the inner logic of the subject area, reveal the meaning and essential relations of its key terms. This thematic and logical structure shows a key term as a part of the terminological system and makes it possible to give students the general idea of the topic and the hierarchy of semantic relations in it (Serova, 2015: 179).

2. Glossary. It contains definitions of the most important terms of the subject area described. Definition as a micricontext relates the term to a whole group, class of items, phenomena, processes, on the one hand, and demonstrates this term in connection with other words of the language, reveals its relations both at paradigmatic and syntagmatic levels, on the other. From an educational point of view, definition as a context is a means of enriching the meaning of a term (Zatonskiy, 2012: 132).

3. Ideographic part (Thesaurus). Each thesaurus entry demonstrates the relations of the entry term at paradigmatic and syntagmatic levels. Vocabulary arranged around the entry term characterizes the concept and constitutes its 'implicit definition' (Yu.N. Karaulov). The relations presented in the thesaurus entry should be essential, regular, and systematic for a group of texts within a certain subject area. To form a student's foreign language mental lexicon as a property of his or her speech ability, it is important to demonstrate logical and associative relations of terms as each word is not only an image of an object but also a system of potential relations which this object can have (Luriya, 1970). A word gets its meaning only as a part of a lexical-semantic group. It is also important that each word in the mental lexicon has links with many others and all the words are arranged into networks, therefore mastering a word will depend on the number of relations of this word in the mental lexicon, their depth and nature (Zalevskaya, 1978; Aitchinson, 1987).

4. Alphabetical dictionary. A bilingual dictionary which contains all the words, presented in the ideographical part.

3. Materials and methods

Development of the model of the *Learner's English-Russian and Russian-English Electronic Thesaurus and Dictionary of Software Terms*

The development of the *Learner's English-Russian and Russian-English Electronic Thesaurus and Dictionary of Software Terms* was organized into four stages: 1) designing; 2) selecting sources for the Thesaurus and dictionary; 3) logical and conceptual analysis of the material selected, developing classification schemes and thesaurus, forming the glossary and compiling the dictionary; 4) implementation of an electronic version and experimental validation.

Designing

The *Learner's thesaurus and dictionary of software terms* was targeted students majoring in Software Engineering. The aim was to develop a concise thesaurus and dictionary of software terms containing about 1000 terms and related words. The requirements to the *Thesaurus and dictionary* were determined, the main being selection of lexical means in accordance with the requirements of curricula, taking into consideration the level of education and the context of students' future occupational activity; integrated description of lexical units, arranging and structuring the terms on the bases of logical and conceptual relations in the terminological system; different "entry points" to the dictionary which allow the user to switch from a word to the concept, and from a concept to the word; singling out key terms of the subject area and their multilevel description, including glossary definitions; increased context part of the dictionary; openness, e.g. the possibility to make changes and to supplement.

Selecting sources for the Thesaurus and dictionary and making a word-list

This part of work includes systematic classification of the subject area, which, in turn, can be divided into three stages (Manual..., 1995: 83-84): 1) an external subject classification with a view to identifying the text material which is to form the empirical basis of the dictionary; 2) an internal subject classification, forming the basis of the systematic structuring and establishing the hierarchy of logical relations between the individual elements; 3) a terminological classification, a systematic listing of the terms of the subject field in question.

The main requirements to the sources for the *Thesaurus and dictionary of software terms* were: the sources should be reliable and generally accepted; chronological adequacy (relevance); reasonable time for obtaining and handling information (Kudashev, 2007: 312-313), as well as authenticity of texts analyzed. The main sources were therefore terminological standards, encyclopedias, reference books, text books, explanatory dictionaries, as well as articles in specialized journals and on corresponding websites. On the basis of the analysis, a global chart of the subject area was created.

The main criteria for including a term into the thesaurus were: semantic value of the term, frequency of use, belonging to the terminological system of the subject area in question, synchronism, derivational value (ability to build a word-family), collocability (Grinev-Grinevich, 2009: 96). The frequency criterion is especially important if the dictionary also includes terms from adjacent fields and words of general language.

Logical and conceptual analysis of the material selected, developing the structure of the *Thesaurus and Dictionary*

As the result of the logical and conceptual analysis, the topics to be included into the thesaurus were selected. As we intended to make a concise thesaurus, the area covered was limited to the most general topics, as well as some topics, studied in the first and second years of the course (Fig. 1)

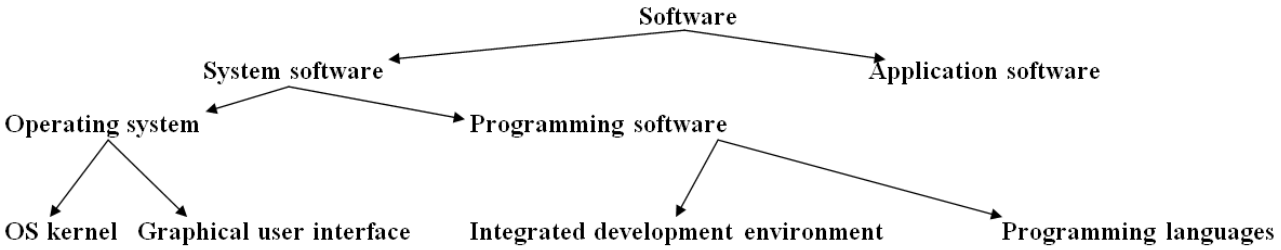

Fig.1. Topics, included into the thesaurus

In addition to the topics, presented in Fig. 1, the thesaurus also includes *Software licensing* and *Software piracy* sections.

Each topic was presented in the form of a classification scheme (Fig. 2).

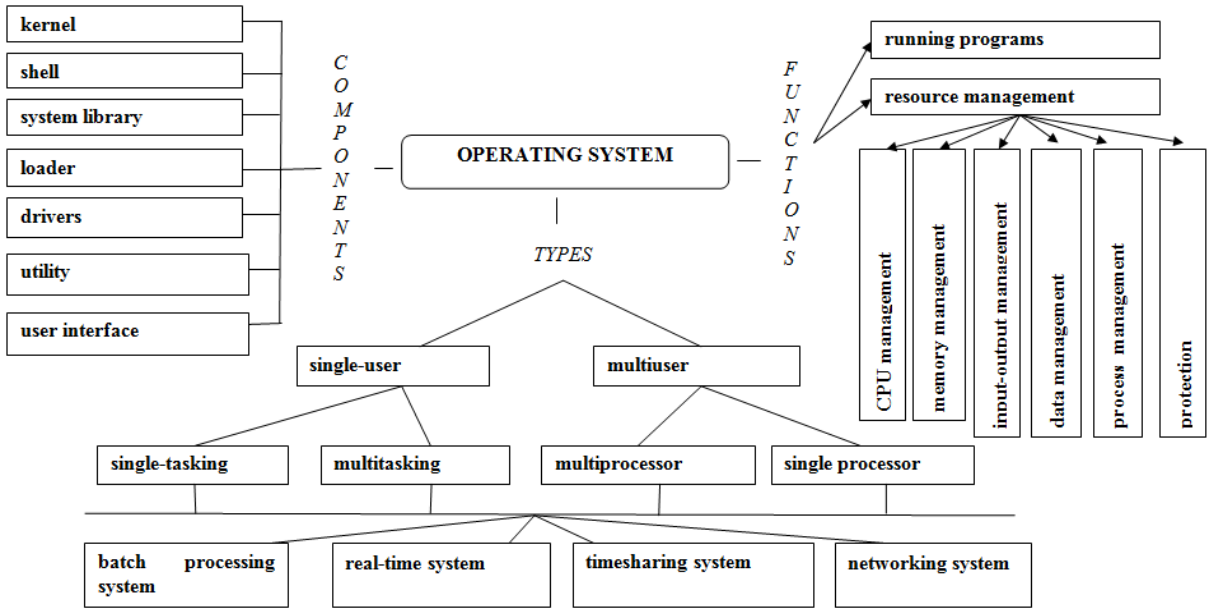

Fig. 2. Example of the classification scheme on "Operating systems"

After that, the vocabulary selected was grouped into topics around the key terms on the basis of semantic relations. Along with paradigmatic relations (synonymy, antonymy, hierarchic relations), we also included associative relations which play an important part on the syntagmatic level. The most typical relations for the area of software are: action – agent, action – object, action – tool, action – mode of action, action – function, action – result, object – property/quality/ quantitative characteristic, object – location. To select the relations on the syntagmatic level, frequency criterion was used. The vocabulary selected was grouped around the entry term in the thesaurus (Fig. 3).

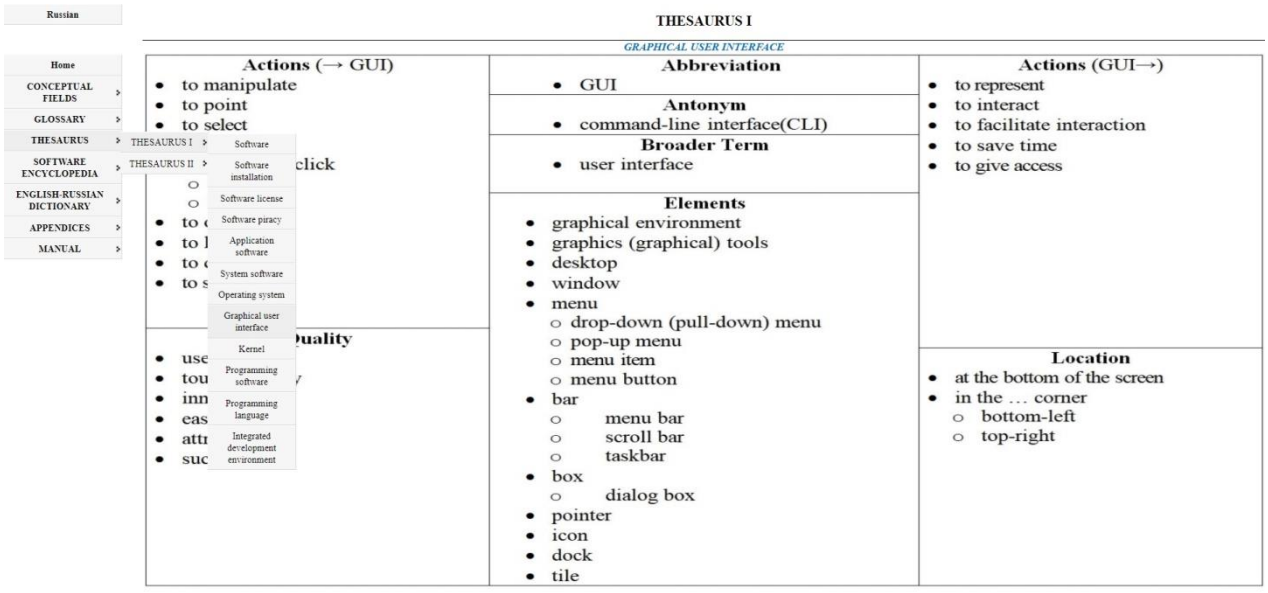

Fig. 3. Example of a thesaurus entry

All the terms presented in the classification schemes were included into the glossary. In total the glossary contains 67 terms with their definitions.

Alphabetical English-Russian and Russian-English dictionaries include all the lexical means presented in the classification schemes and the thesaurus. While compiling a bilingual translation dictionary, one of important issues is how to present terminological word-combinations which can be presented as independent entries or grouped together. We have combined both approaches in

the dictionaries, which speeds up the search of a terminological combination, on the one hand, and makes it possible to show the connection between the main term and its combinations, on the other.

Working on the *Thesaurus and dictionary*, we took the decision to expand its context part. Along with examples of word-combinations and sentences, we included an encyclopedic part on the main topics of the thesaurus (Fig. 4). It allows us to actualize the thesaurus entries, demonstrate how paradigmatic and syntagmatic relations of the key terms work in texts.

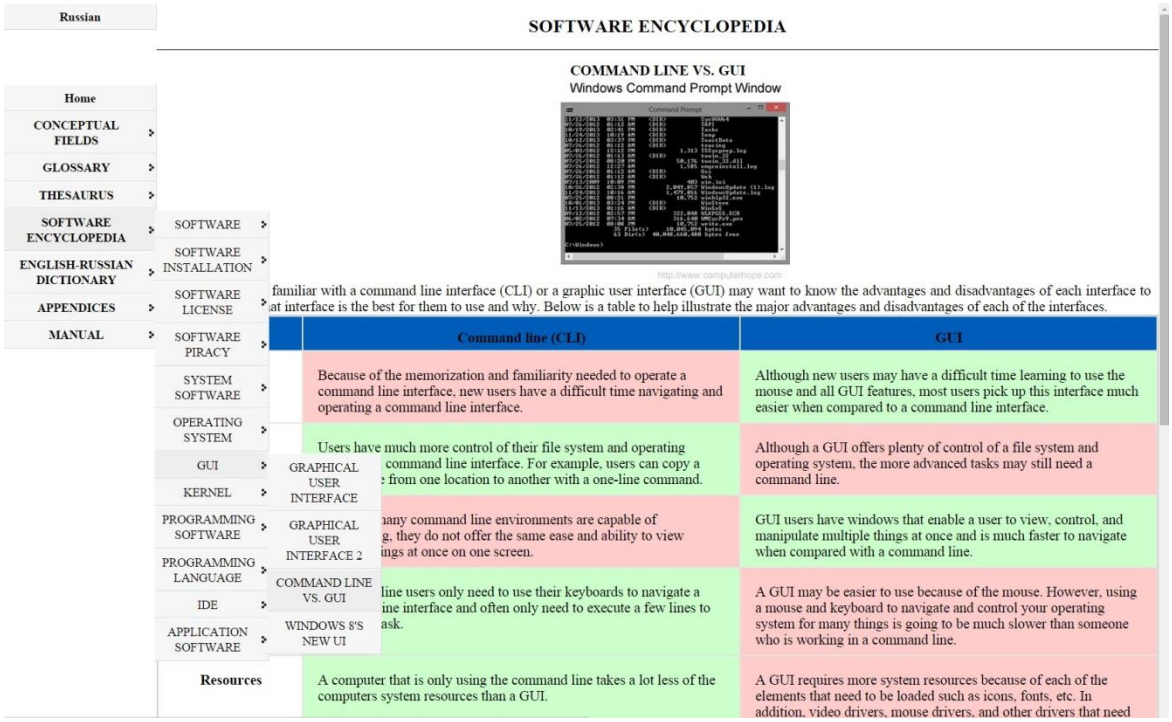

Fig. 4. Example of a text in the encyclopedic part

The *Thesaurus and Dictionary* also contains supplements: information on the meaning of English prefixes and suffixes, and how to read characters.

The electronic model of the *Thesaurus and Dictionary* was developed using Microsoft FrontPage 2003, a HTML editor and Web site administration tool (Chainikova, 2014).

4. Results and Discussion

The experimental work was conducted at the Berezniki Branch of Perm National Research Polytechnic University. 116 students of the second-year of study majoring in software engineering and studying the subject “English for professional purposes” took part in experimental learning.

A special complex of exercises for developing foreign language lexical skills and speech abilities (informative reading, monological speaking) was developed. This complex is based on four interrelated stages of lexical skills and speech abilities development: 1) semantization and reproduction of lexical means; 2) stereotyping and varying of lexical means; 3) systematic application of FL lexical skills, their dynamic integration with other speech skills during oral and written communication; 4) synthesis and systematization of FL lexical skills at the stage of development of creative speech abilities (Serova, 1989: 121-122).

During the first and the second stages, *The Thesaurus and Dictionary* is used as an external informative basis, as a means of development of the conceptual system expressed through foreign language words with their multiple relations. The primary purpose and the result of this work is to develop the FL mental lexicon of the students. At the following stages the *Thesaurus and Dictionary* is used as a source of additional information, and when needed, as an external informative basis.

To check the efficiency of the elaborated methods, pre-test, mid-tests and post-test were conducted. Lexical skills development was assessed on the basis of results achieved in the assignments: 1) lexical assignments without any communication situation: a) creating a mind map, b) exclude the word which doesn't correspond to the topic (odd one out), c) find a synonym, d) match the term and its definition, e) cloze-test; 2) informative reading assignments presupposing performing lexical operations: a) write out key words from the text, b) write a summary of the text as theme-rheme scheme; 3) monological speaking assignments presupposing performing lexical operations: a) give the definition of a term, b) speak on the topic (describe/ characterize/ explain …).

When evaluating the results, the success rate was determined in accordance with the formula Q=a/n, where *a* – number of tasks done properly, *n* – the general number of tasks. Q below 0,5 was assessed as insufficient, 0,51–0,79 – a sufficient level, more than 0,8 – a high level.

The work involved three stages:

1. Pre-test, which included assignments without any communication situation as well as a questionnaire to determine the initial level of lexical skills development.
2. Experimental learning with mid-tests and a post-test including the three types of assignments.
3. Analyzing the results of the experimental learning.

According to the results, 95 % of participants showed sufficient and high levels of lexical skills and speech abilities at the end of the course.

In addition to the experimental learning, a pedagogical experiment was conducted. The experimental group included 17 students, the control group – 15 students. The results of the experiment are presented in the table (Table 1).

Table 1. Results of the post-test

Type of assignment		experimental group		control group	
		Q≥0,51	Q<0,51	Q≥0,51	Q<0,51
Assignments without any communication situation		15	2	12	3
Receptive lexical skills	Writing out key words from the text	16	1	13	2
	Writing a summary of the text as a theme-rheme scheme	15	2	11	4
Productive lexical skills	Giving the definition of a term	16	1	12	3
	Monologic speaking	15	2	10	5

To statistically process the data, we used Fisher's exact tests and Cochran-Mantel-Haenszel test. The latter one is suitable for the analysis of experiments, conducted multiple times or in different conditions. The null hypothesis in this case is that the relative proportions of one variable are independent of the other variable within the repeats. In other words, there is no consistent difference in proportions in the tables of experimental data. In addition to testing the null hypothesis, the Cochran-Mantel-Haenszel test also produces an estimate of the common odds ratio, how big the effect is when pooled across the different repeats of the experiment. Technically, the tests were implemented in freeware R environment.

The result of Cochran-Mantel-Haenszel test:

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Mantel-Haenszel X-squared = 5.2212, df = 1, p-value = 0.02231
alternative hypothesis: true common odds ratio is not equal to 1
95 percent confidence interval: 1.147503 7.113937
sample estimates: common odds ratio 2.857143
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shows that P-value is equal to 0.02231. This means that the connection to the application of the method is strong after correction for the strata.

Fisher test allows to check how efficient the method is within strata:

Lexical assignments without any communication situation
`Fisher test p-value:  0.6454394`

Writing out key words from the text
`Fisher test p-value:  0.5887097`

Writing a summary of the text as a theme-rheme scheme
`Fisher test p-value:  0.3828019`

Giving the definition of a term
`Fisher test p-value:  0.3192436`

Monologic speaking
`Fishertestp-value:  0.2094611`

shows that there is almost no difference in the proportions within strata.

The results of the pedagogical experiment thereby are sufficiently reliable and prove the effective use of the *Learner's thesaurus and dictionary* as a mean of a foreign language lexical competence development.

5. Conclusions

The development of foreign language professional mental lexicon is based on the development of conceptual and categorical system through the formation of a network of key terms of a subject area which have strong relations to each other and to other words of the second language. The most effective means of developing lexical competence can be a learner's terminological thesaurus and dictionary which includes four main components: 1) classification part, 2) ideographic part (thesaurus), 3) glossary, 4) bilingual dictionary. Its application makes it possible: 1) to develop student's knowledge in a particular subject area; 2) to develop terminological competence of a future specialist; 3) to demonstrate potential relations of key terms of a subject area (syntagmatic and paradigmatic). Expanding its context part due to increased number of examples of word-combinations and sentences as well as including specially selected texts in the encyclopedic part allows us to demonstrate how different functions of lexical items are implemented in text. Full implementation of the functions of the learner's thesaurus and dictionary is possible only in electronic format.

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