

Specialised communication. Scientific and terminology literacy.

Ingrid Cibiková¹
Gabriela Siantová²
Katarína Mital'ová³

¹ Katedra anglistiky a amerikanistiky, Filozofická fakulta, Univerzita sv. Cyrila a Metoda v Trnave; Námestie J. Herdu 577/2, 917 01 Trnava; ingrid.cibikova@ucm.sk

² Katedra anglistiky a amerikanistiky, Filozofická fakulta, Univerzita sv. Cyrila a Metoda v Trnave; Námestie J. Herdu 577/2, 917 01 Trnava; gabriela.siantova@ucm.sk

³ Katedra chémie, Fakulta prírodných vied, Univerzita sv. Cyrila a Metoda v Trnave; Námestie J. Herdu 577/2, 917 01 Trnava; katarinamitalova@gmail.com

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Abstract The paper reflects the introductory thinking about specialised communication in foreign language education in primary and secondary vocational schools in Slovakia. The authors define the specialised communication, CLIL fusion, the role of terminology, scientific and terminology literacy, focus on terminology culture and do dictionary survey in primary and secondary schools. They also point out the need of improving terminological literacy level and terminological culture in secondary and university language teaching and lifelong education. The authors suggest to integrate the terminology and terminological work into secondary and university foreign language teaching. The survey on using bilingual dictionaries in schools has revealed that there is the absence of conceptual oriented terminology products (glossaries, dictionaries, taxonomies, nomenclatures) with definitions and context in the Slovak republic.

Key words Specialised communication, scientific literacy, terminology literacy, CLIL fusion, special English-Slovak dictionary.

1. INTRODUCTION

The paper reflects the introductory thinking about specialised communication in foreign language education in primary and secondary vocational schools in Slovakia and comes out the KEGA project. The objective of the project designated *Specialised communication and terminological literacy in foreign language education in Secondary Vocational education* is to detect the needs of students and teachers for complementing the bilingual material for teaching specialised communication at Secondary Vocational schools. The key publication of the project is going to be a supplementary teaching material/manual (theoretical, terminological, and didactical) for Secondary Vocational schools focused on the Slovak-English specialised communication, mainly bilingual terminology with a specific aspect of Slovak speakers, labour market and foreign company requirements. The core specialised texts for terminology excerpt are Chemistry, Biology, Mathematic and Physics subject fields as a foundation for natural

sciences. The bilingual Slovak-English/English-Slovak specialised dictionary of natural sciences will be the practical outcome of the project. The conceptual oriented dictionary will contain about 300 terms with Slovak and English explanation (definition), equivalent and context. The prepared manual can be primarily useful for a teaching and study material for Secondary Vocational schools. It can also be used by primary school teachers, especially those applying CLIL fusion methodology.

The authors answer the questions what makes science the science, what are the problems of teaching terminology and science and what is the availability of special English/Slovak dictionaries on the Slovak market. Unfortunately, teaching terminology in Secondary Vocational schools and universities is missing, there is the absence of bilingual conceptual oriented terminology products (glossaries, dictionaries, taxonomies, ontologies, nomenclatures) with definitions and context in the Slovak republic. The paper deals with the special language and specialised communication, focuses on the importance of terminology and terminological work. The authors define CLIL method, scientific and terminological literacy and pointed out of breaking rules in the case of terminology culture by individuals or community of specialists.

The survey of giving academic lectures at schools and universities (medical faculties, faculties of economics) revealed that many lecturers do not feel the need giving lectures in Slovak with consistent Slovak terminology and give lectures in English language. So students do not know and use national domain terminology which is not developing. The situation allows massive borrowing from English, hybrid terms and hybridisation of specialised communication. The academics relied on new technologies, giving examples from practice, on the creativity of students and understanding the system of science, conceptual system of subject field automatically without education. The educators forget that without theory there is no practice and in the flood of website information is impossible to understand the system of science. There is no special communication without terminology and no documentation of knowledge.

2. CONTENT AND LANGUAGE INTEGRATED LEARNING (CLIL)

Content and Language Integrated Learning has been defined by many scholars. According to Coyle CLIL method can be defined as “*Content and Language Integrated Learning (CLIL)* as a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language” (Coyle et al., 2010, p. 1). Coyle explains that an additional language is often a learner's second (foreign) or non-native language. There is focus not only on content, but also on language. CLIL is not a new form of language education and not form of subject education but it is an innovative fusion of both (Coyle et al., 2010).

Dale and Tanner claim that CLIL is the way of teaching where subject content (history, science or physical education) is taught through language (often English). Further, CLIL subject teachers implement language into their lessons and CLIL language teachers interweave the subject into their language lessons. Sometimes teachers focus on both the content and the language (Dale & Tanner, 2010).

According to Marsh and Langé CLIL means both studying subject through a second/foreign language and acquiring a second/foreign language by studying a content-based subject. They both describe CLIL as “a generic term which refers to any educational situation in which an additional language, and therefore not the most widely used language of the environment, is used for the teaching and learning of subjects other than the language itself” (Marsh, Langé, 2000).

Tennant sees Content and Language Integrated Learning (CLIL) as “an increasingly popular teaching method” where “regular subjects, such as history and maths, are taught in a foreign language in order to enhance target language exposure and acquisition”. Tennant continues that “CLIL is now one of the new buzz words, or acronyms, in EFL/ELT.” He says that “CLIL is simply another name for cross-curricula content and not such a bright new thing in teaching” (Tennant, 2005).

3. SPECIAL LANGUAGE AND SPECIALISED COMMUNICATION

Special/specialised language and specialised communication has been defined by standards and by linguists, translators and terminologists.

According to ISO standard *special language/specialised language* or language for specific purposes (LSP) is a natural language used in communication between experts in a domain and characterized by the use of specific linguistic means of expression. The specific linguistic means of expression always include domain-specific terminology and phraseology and also can cover stylistic or syntactic features (ISO 1087:2019, 3.1.9).

Similar clear definitions are given by Canadian terminologists Pavel & Nolet and Sager.

Specialized language/also special language is a natural language used by a community of subject specialists in a particular field of knowledge (Pavel & Nolet, 2001, p. 115).

Difference between special language, general language, specialised communication and general communication has been discussed by Cabré and Sager.

Special languages have been defined as semi-autonomous, complex semiotic systems based on and derived from general language; their effective use is restricted to people who have received a special education and who use these languages for communication with their professional peers and associates in the same or related fields of knowledge (Sager, 1990, p. 105).

Specialized communication differs from general communication in two ways: in the type of oral or written texts it produces, and in the use of a specific terminology (Cabré, 1992, p. 47).

In principle, subject-specific communication among specialists is not very different from general communication. The restrictions imposed on the elements involved in special communication that give it a specificity not found in general communication are of a different sort (Cabré, 1992, p. 45, 46).

The role of terms and definitions in special communication are explained by Sager.

In special communication terms and standardised terms make a critical contribution to achieving complete and effective communication. This they do by making the choice of language, knowledge and intention more systematic and hence easier (Sager, 1990, p. 105).

In special communication terms are considered substitute labels for definitions because only a full and precise definition is the proper linguistic representation of a concept (Sager, 1990, p. 109).

As the Professor of Terminology at the University of Vienna, Wolfgang Nedobity claims that specialised languages are “the tools for subject communication by which modern society conveys its achievements and experience from generation to generation. These languages are characterized by using clearly defined concepts, to which preferably unambiguous terms are assigned” (Nedobity, 1983, p. 69).

Moreover, the present-day specialised communication that is, as stated by B. Ronnie Wilbur, characterised by internationalisation and globalisation, must be achieved by a precise communicative instrument. An important role is played in this respect by vocabulary in which for the purposes of specialised communication terms have evolved as a specific stylistic layer (Wilbur, 2009).

4. THE ROLE OF TERMINOLOGY AND TERMINOLOGY WORK

The terminology is not limited to designating/naming the concepts, but also to the documentation of knowledge and conceptual systems. Terminology deals with the classification system as a structured scheme for classifying knowledge, beings and things, in order to improve study and research, which is created according to alphabetical, associative, hierarchical, numerical, ideological, chronological, spatial and other criteria. The ignorance of conceptual system as a set of concepts divided according to the logical relationships between them may be a serious problem.

The specialists in terminology Silvia Pavel and Diane Nolet continues that “*the main function of terminology* is the transfer of specialized knowledge and the authentication of related terminological usage” (Pavel and Nolet, 2001, p.8).

Pavel and Nolet claim that *terminology* is “the set of special words belonging to a science, an art, an author, or a social entity, for example, the terminology of medicine or the terminology of computer specialists. Pavel and Nolet add that terminology is part of applied linguistics, a science that includes work in specialized lexicography, specialized translation, technical writing, and language teaching” (Pavel- Nolet, 2001, p.17).

Terminology work is the activity concerned with “*systematic collection, description, processing and presentation of concepts and their designation*” (ISO 1087-1:2000). Sometimes used interchangeably with terminology management or terminography, although both are generally considered as only a part of terminology management (Wright and Budin, 1997).

Pavel and Nolet states that “terminology work requires a number of abilities, such as:

- the ability to identify the terms that designate the concepts that belong to a subject field;
- the ability to confirm the usage of the terms in pertinent reference documents;
- the ability to describe concepts concisely;
- the ability to distinguish correct usage from improper usage;
- the ability to recommend or to discourage certain usages with a view to facilitating unambiguous communication” (Pavel-Nolet, 2011, p.18).

As stated by the Conference of Translation Services of European States (COTSOES), the growing importance of terminology is recognised even greater with the growing demands of our multilingual society and external communication. Most documents today are designed for specialised communication, including business, law, pharmacy and commercial texts. These texts are written in special language and the majority of text is composed of terminology of a particular domain. Moreover, the authors claim, that terminology is an important part of legislation and international co-operation (it is essential for conceptually coherent legislation, it makes international dialogues between authorities easier, etc.); similarly, terminology is an important economic factor, it serves the enterprise culture, as well as it is recognised as an important aid for translators (it captures the results of lengthy research and makes it accessible to a wide circle of people, it prevents duplication of work, etc.) (COTSOES, 2002).

According to COTSOES, “experts use their special language to exchange specialist information, and this special language is distinguished first and foremost by its own special terminology (= specialised vocabulary). The increasing complexity of technical content and of specialist knowledge as a whole, as well as the interlinking and overlapping of specialist subject fields, make ever greater demands on the accuracy of specialist communication. Terminology as a specialist subject and research field has its place here: it helps to make specialist communication quicker and easier and to ensure its quality by preparing mono- and multilingual specialised vocabularies (= terminologies) and making them available to the widest possible circle of users via the data communications networks.” (COTSOES, 2002. p.8)

UNESCO’s Guidelines for Terminology Policies state, that “a language community whose language has not developed scientific and technical terminologies is unavoidably forced to use some other, more developed foreign language for domain communication. Terminology plays a crucial role wherever and whenever domain-specific information and knowledge is: generated (e.g. in research and development); used (e.g. in specialised texts);

recorded and processed (e.g. in databases); passed on (via training and teaching); implemented (e.g. in technology and knowledge transfer); or translated and interpreted” (UNESCO, 2005. p.2-3).

5. THE CONSISTENCY OF SCIENTIFIC AND TERMINOLOGICAL LITERACY

Only a few linguists, terminologists and specialists have explained the concepts of *terminology literacy*, *scientific literacy* and *terminology culture*. It seems that they have not been the subject of terminology research for decades either in Slovakia and abroad.

But when we look on the concept of *scientific literacy* or *literacy in science* it can be found numerous definitions and what is more the designations are definitely intertwined and interrelated. Probably the first definition of scientific literacy was published by Hurd (1958):

“Understanding science means knowing something about the procedure-s of theoretical inquiry and recognizing these procedures as the means by which the imagination of man and the laws of nature. “Through the years the definition evolved and many different definitions were published by various authors (e. g. Waterman, 1960, DeBoer 1991, Roberts 1983).

From the scientific and terminological point of view one of the most complex interpretations was established by Bybee in 1997 which consists of four *functional levels*: (i) *nominal* (can recognise scientific terms, but does not have a clear understanding of the meaning); (ii) *functional* (can use scientific and technological vocabulary, but usually this is only out of context as is the case for example in a school test of examination); (iii) *conceptual and procedural* (demonstrates understanding and a relationship between concepts and can use processes with meaning); (iv) *multidimensional* (not only has understanding, but has developed perspectives of science and technology that include the nature of science, the role of science and technology in personal life and society). This definition is not only metaphoric definition such as others (Holbrook, Rannikmae, 2009), but it also describes individual steps of scientific literacy obtaining. In another words the basic of scientific literacy is knowledge of understanding and using the scientific terms, which is the foundation of scientific and terminology literacy definition.

On the other hand, the linguists and terminologists argue about these concepts, but usually do not define them, although they are the key terms in terminology conceptual system. In Slovakia these concepts have been discussed by Masár, Mistrík and defined by Stoffa (2008) and Cibíková (2009, 2013). Everyday language reality and today’s society urgently requires a reassessment of terminological literacy and culture. It is very important to implement terminology into education at the beginning of specialised education. We still remember the statements of our former teachers from University in Nitra that “to know means to name correctly” (Štefan Horváth, 1983, lecture manuscript) and connect them with the current language user situation and desire to build a knowledge society in Slovakia. Systematic terminological work is the result of the educational process not only in translation but also in education of subject specialists in a particular field of knowledge.

Most dictionaries and encyclopedias define literacy in general as the ability of a person to read and write, which may be considered as a primary literacy. But today has been presented and formed secondary literacies such as (computer, scientific, technical, linguistic, artistic, terminological) literacy and the ability to negotiate, to defend, to present, which take to the individual an

active part in today's specialised/professional communication. In addition, today's European should be able to apply these types of secondary literacies in a foreign language and in foreign companies. Terminology literacy should be an essential and coherent for all types of secondary literacies. Terminology literacy does not mean the ability to designate objects and processes correctly but it is more complex ability.

Stoffa (2008) defines terminological literacy (conceptual literacy) as the ability of terminology user to use the correct terms and solve the terminological problems in their subject field".

Later Cíbiková (2009, 2013) reflects the current sociolinguistic situation, re-evaluates and re-formulates terminology literacy as the ability of a language user to use adequate and consistent terms in functional communication and at the same time to do terminology work in a specific cultural and sociolinguistic situation.

Cíbiková (2021) finally re-defines *terminology literacy as the ability of a language users and specialists to use consistent terminology in functional specialised communication in 8 interrelated levels: basic (can recognise, characterise and understand the content of the concept, designate the concepts according terminology principles, and form term according national term formation methods), functional (can use terminology in the domain context and special communication), conceptual oriented (can understand and clarify a relationship between concepts), defining (can facilitate the writing of definitions, define the concepts according to principles for definition writing), interdisciplinary (can differentiate the same terms in different subject field), comparative (can facilitate the comparative analysis of concepts and designations across languages), documentary (can form the basis for a uniform and standardised terminology, can do terminology work and compile the terminographical products) and perspective (can develop perspectives of national terminology that include the nature of terminology, the role of terminology in professional life and society).*

This means that the consistency of scientific and terminology literacy as a systematic documentation of human knowledge may be understood.

Terminology culture

Linguists in Slovakia (Masár, Horecký, Považaj, Dolník, Findra, Kačala, Mislovičová, Ološtiak and others In: collection of papers *Jazyková kultúra na začiatku 3. tisícročia*, 2009) most often deal with language culture, of which terminological culture is a part and at the same time the superordinate concept. From Karcova's review (*Slovenská reč*, 2010, vol.75, č.3) her conclusion was interested, which can be a partial answer to the questions of increasing language culture. It addresses the care and cultivation of language culture in its naturalness, adequacy and balance. The reviewer talks about different views on language culture, its capture, the functions and way of its cultivation, and the possibilities of different solutions.

Masár (*Kultúra slova*, 1997) explains that "terminological culture is an integral part of language culture together with other terminological criteria such as semantic transparency, consistency, precise definition of the term and a clear style of specialised text". He adds that if the term does not meet these principles, its naming power in the special text decreases and causes the barriers in specialised communication. Masár thinks about the need of development of Slovak terminology, he notices the changes in the language situation after 1989 and points out the massive borrowing from English, but also the substitution of domestic language means by foreign language means. In his opinion, this leads to the

convergence of Slovak with English. He also opposes to the uncritical download of all that globalisation entails and advocates the intervention into official texts (Available at: <<http://opus.juls.savba.sk/attachments/publications/2010-karcova-recenzia.pdf>>, s. 185-191).

Stoffa tried to define terminological culture in the scientific conference Terminology Forum II. He defines *terminological culture* (conceptual culture) as "adequate use of terms in accordance with the rules and system of literary language, scientific style, with specialised national and international standards and practices of the relevant specialised/professional community". Cíbiková defines *terminological culture* as a part of a language culture that expresses an individual's or group's attitude to national terminology, to systematic terminological work, in accordance with standards, literary language, specialised/professional style, customs and compromises of the specialised community, in accordance with the development of terminology and scientific discipline.

Later the definition has been re-formulated by Cíbiková (2013) under the globalisation pressure and her experience with real terminological culture and terminological literacy in Slovakia. *Terminological culture as a part of language culture is use of unified and consistent national terminology in the spirit of international terminological standards and terminology principles, in order to optimise specialised communication in the current cultural, sociolinguistic and professional situation.*

Both terms as well as their definitions are related and complementary. Without terminology literacy there is no terminology culture.

6. SURVEY ON USING AND EXISTENCE OF BILINGUAL DICTIONARIES

The survey was aimed at finding out the responses for two survey questions:

Q1: Is there a sufficient amount of any natural science bilingual dictionaries on the Slovak market for the use of CLIL method in education?

Q2: Is the development of students' language skills more effective by using CLIL method in teaching vocabulary?

A questionnaire-based survey focused on usage of natural sciences bilingual dictionaries (English/Slovak) and experience with teaching these subjects through the CLIL method was piloted in January and February 2020. The questionnaire was sent to twenty-four primary schools and twenty-eight bilingual secondary grammar schools which represents fifty-two addressed schools in total. Overall return was 22 questionnaires from the teachers of chosen primary schools (which represents 81.8% female teachers and 18.2% male teachers) and 20 questionnaires from the teachers of bilingual secondary grammar schools (80% female teachers and 20% male teachers) which counts 42 questionnaires altogether. The respondents providing their answers were only from two natural science disciplines, namely physics and chemistry. The data from biology and mathematics were not provided by any respondent and for that reason the results of the survey are processed limited to chemistry and physics. Questions in the questionnaire were stated in Slovak language.

The main aim of survey was to find out if there was enough English/Slovak dictionaries of natural sciences on the Slovak market. The next objective was to find out if CLIL method is used in teaching natural sciences. The questionnaire should have discovered

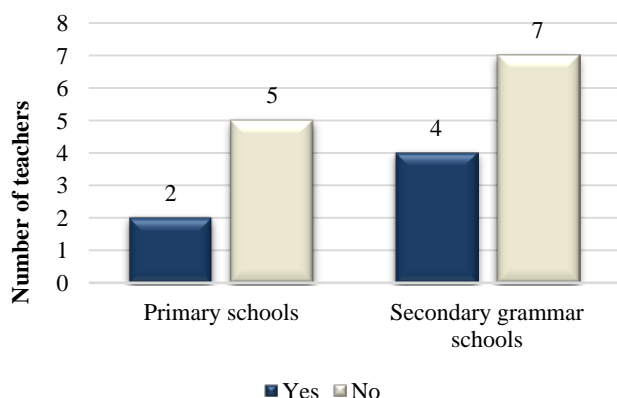
too if the respondents found the CLIL method beneficial in teaching natural science vocabulary/terminology. Sixteen questions were asked in total.

Physics and chemistry teachers indicated the length of their teaching practice. An average teaching practice lasted sixteen years at primary schools and fourteen years at bilingual secondary grammar schools.

Referring to teaching specialisation the results of the survey manifest that 3 teachers at primary and secondary grammar schools teach physics and mathematics, 3 teachers teach chemistry and physics, 1 teacher teaches physics and physical education, 8 teachers teach chemistry and maths, 6 teachers teach chemistry and biology, 1 geography teacher represents the other subject that is taught in combination with chemistry, 5 teachers teach both physics and chemistry, 6 teachers teach physics and mathematics, 4 teachers teach chemistry and mathematics and 5 teachers teach chemistry and biology.

Respondents were asked to state their level of English language. At primary schools 9 teachers (40.9%) were at intermediate level, and 10 teachers were upper-intermediate level (45.45%), 2 teachers (9.09%) advanced level and 1 (4.5%) teacher could not speak English. At bilingual secondary grammar schools 11 teachers (55%) reached advanced language level and 9 teachers (45%) achieved the upper intermediate level.

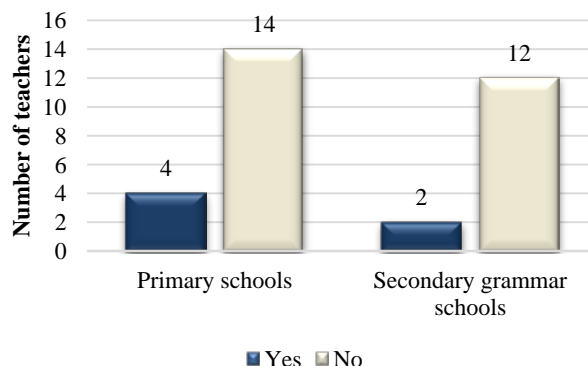
The first question in the questionnaire asked the teacher respondents about their use of bilingual English/Slovak dictionary in teaching physics. The question was answered by 7 teachers of physics at primary schools. The research shows that 5 of the teacher respondents (71.4%) do not use dictionary in teaching physics, 2 teachers use bilingual internet dictionary compiled by a Terminology Commission of Slovak physical society in 2007 by Peter Čerňanský, Ivan Červeň et al. The question was answered by 7 teachers of physics at bilingual secondary grammar schools (63.63%) who do not use dictionary in teaching physics and 4 teachers (36.37%) who use Macmillan dictionary available on internet.



Graph 1: [Graphical comparison of using English-Slovak/Slovak-English dictionary of physics in teaching physics]

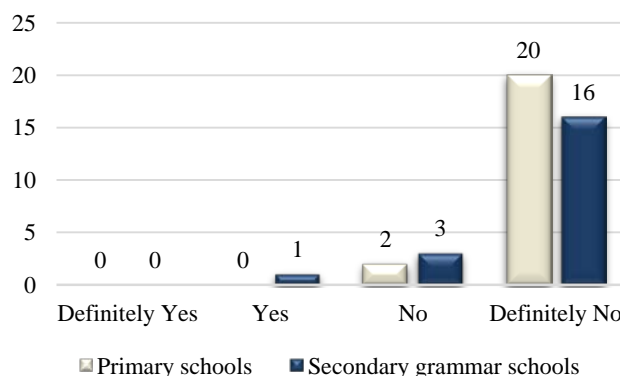
The second question in the questionnaire asked the respondents about using of bilingual English/Slovak dictionary in teaching chemistry. This question was answered by 18 respondents who teach chemistry at primary schools. The research shows that 14 of them (77.78%) do not use dictionary in teaching chemistry. 12 teachers at

bilingual secondary grammar schools (85.7%) do not use dictionary in teaching chemistry and 2 teachers (14.28%) use dictionaries available on the internet.



Graph 2: [Graphical comparison of using of bilingual English/Slovak dictionary in teaching chemistry]

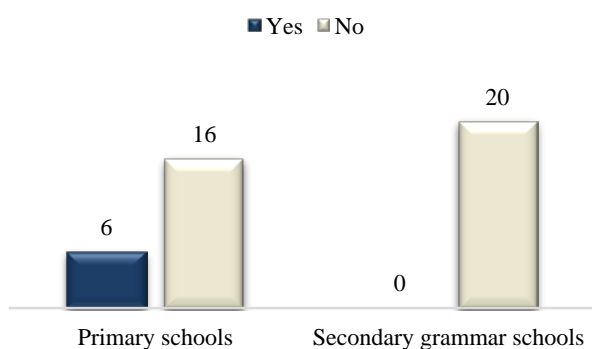
In the third question aimed at inquiry if there is enough dictionaries available on the Slovak market for teaching physics and chemistry, the survey has showed that 20 from 22 teachers (90.9%) at primary schools and 16 from 20 teachers at bilingual secondary grammar schools (80%) thought that there is a lack of bilingual English/Slovak dictionaries of physics and chemistry.



Graph 3: [Availability of bilingual English/Slovak dictionaries of physics and chemistry on the Slovak market]

The fourth question asked respondents about necessity to compile bilingual English/Slovak dictionary of physics and chemistry for teaching vocabulary. The research shows that for all teachers (100%) at primary schools and 19 teachers at bilingual secondary grammar schools (95%) it is more than needed to compile a bilingual dictionary of physics and chemistry.

The second part of the question inquired about having respondents ever compiled a bilingual dictionary. 6 teachers at primary schools ever tried to compile a bilingual dictionary but they had never finished it. As a reason was given a lack of time and a difficulty to accomplish this target due to a low level of their English. No teacher at bilingual secondary grammar school had ever tried to compile a bilingual dictionary.



Graph 4: [A number of teachers who have ever tried to compile a bilingual English/Slovak dictionary of physics and chemistry]

The respondents in the sixth question were asked if they verified correctness of the terminology they used in teaching physics or chemistry. All teacher respondents at primary schools (12) verified correctness mainly on the internet sources. 16 teachers at bilingual secondary grammar schools always verified if the terminology was right and 2 respondents had never verified terminology.

If the question six was answered positively, the respondents were further asked to specify in which way they verified accuracy of using terminology in materials they used in method CLIL. This question was answered by 12 teachers at primary schools and 20 teachers at bilingual secondary grammar schools that really use CLIL (regularly, seldom). At first, teachers usually use some of the internet sources namely: Glossary of Physics Terms,¹ Terminologies in Physics,² Glossary of Physics,³ The Physics of the Universe,⁴ Kalyan City Life⁵ and MacMillan Dictionary.⁶

Some of the respondents verify terminology with their colleagues.

In the question number eight the respondents were asked if they had ever heard a term CLIL (Content and language integrated learning). The survey has showed that most of the respondents (73%) at primary schools and all teachers at bilingual secondary grammar schools (100%) are aware of the meaning of the term CLIL. There could be many factors that might have influenced the responses to the question. Age is the most important factor as all older teachers put negative answer. Teaching experience, the lack of information about meaning and using the method could be some of other factors that influenced the teachers' view on the CLIL method.

Question number nine the purpose of which was to find out whether teacher respondents thought that physics or chemistry vocabulary were appropriate for teaching through the CLIL method was put. 13 respondents (59%) at primary schools agreed with the subject's appropriateness. Other respondents could not answer. All of 13 respondents stated their appropriateness due to technical terms. All

¹Glossary of Physics Terms, available at: <<http://tutor4physics.com/glossary.htm>>

²Terminologies in Physics, available at: <https://www.tutorialspoint.com/physics_part2/terminologies_in_physics.htm>

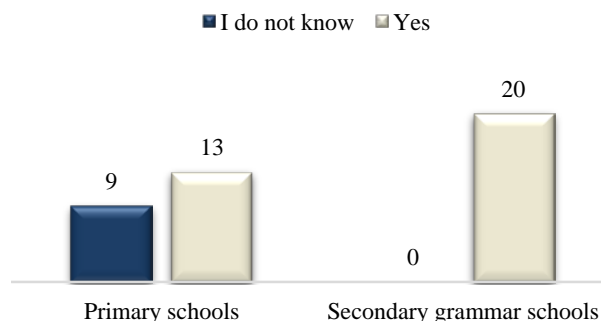
³Glossary of Physics, available at: <https://en.wikipedia.org/wiki/Glossary_of_physics>

⁴The Physics of the Universe, available at: <<https://www.physicsoftheuniverse.com/glossary.html>>

⁵Kalyan City Life, available at: <<https://kalyan-city.blogspot.com/2010/09/physics-definitions-terminology.html>>

⁶MacMillan Dictionary, available at: <<https://www.macmillandictionary.com/>>

respondents at bilingual secondary grammar schools (100%) thought that physics and chemistry were appropriate subjects for CLIL method teaching.

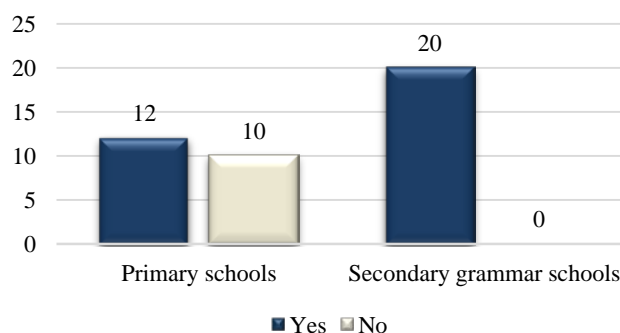


Graph 5: [Graphical comparison of appropriateness of physics and chemistry for teaching through CLIL method]

The tenth question asked the respondents if they had ever applied the CLIL method for teaching vocabulary in physics and chemistry lessons. In case this question was answered positively, they were further asked to state what way they used for assessment of a CLIL lesson. Ten respondents at primary schools had never used the CLIL method. The rest of the respondents had some experience with using the method in their lessons. As the way used for assessment of a CLIL lesson as a prevailing answer was stated an oral evaluation.

The results coming from the respondents' answers at bilingual secondary grammar schools proved that all teachers used the CLIL method not only in the teaching of physics and chemistry, but also in biology and mathematics. Most teachers provide feedback on language in class and clarify the mistakes on tests and reflect this in a grade. They do a project once in a while, where part of the grade is determined by a presentation or another language output activity.

If the respondents never used the CLIL method, they were asked to reply to questions from sixth to eleventh focused on using foreign languages in a chemistry and physics lesson.

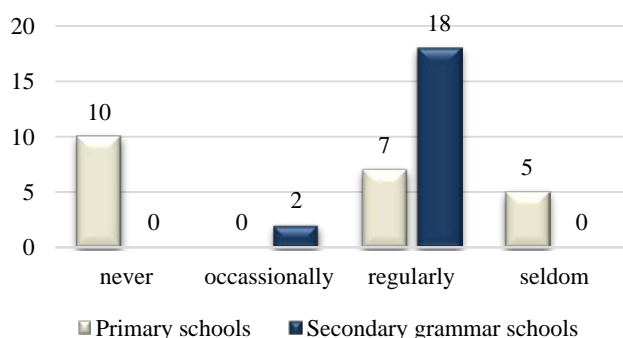


Graph 6: [Teachers who applied CLIL method in teaching vocabulary (physics, chemistry)]

The question number eleven was focused on frequency of applying foreign materials in teaching vocabulary in physics and chemistry lessons. The results are as follows: 10 teachers (45%) at primary schools have never used foreign materials in their lessons, 7 teachers (32%) use foreign materials regularly, 5 teacher respondents (23%)

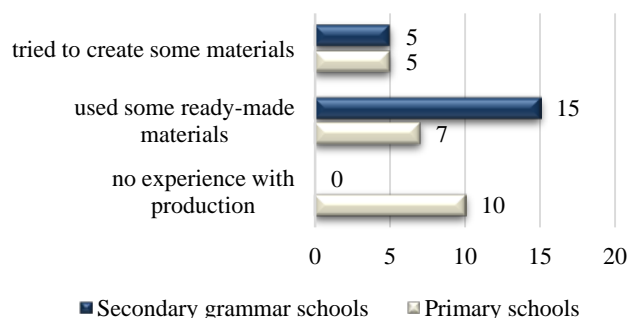
use the materials rarely. Some of the teachers at primary schools who sometimes use foreign materials are willing to change their opinion and try to apply the CLIL method in their lesson. However, it will depend on their motivation and willingness to invest a lot of time and energy to implement the method.

Up to 18 teachers (90%) at bilingual secondary schools regularly use foreign language materials and 2 teachers use these materials occasionally. Bilingual schools are known for their quality. Students intensively study the language in the first class, which can also be called linguistic preparation, because the weekly lesson of the language in this year presents twenty hours. The remaining ten hours are divided among the other subjects. Other years students learn subjects in English language and end with a state language examination.



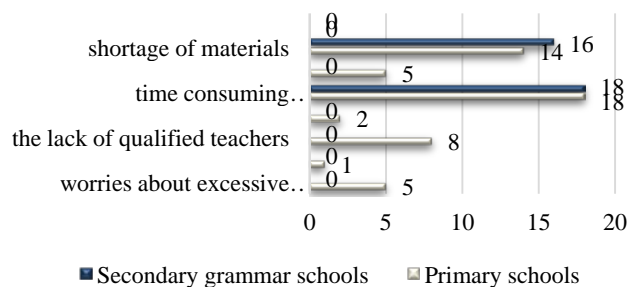
Graph 7: [Application of foreign materials in teaching vocabulary in physics and chemistry]

The twelfth question was targeted on finding out if the teacher respondents have ever had some experience with CLIL materials' production to teach vocabulary in physics or chemistry lessons or if they preferred using of ready-made materials. 10 teachers (45.45%) at primary schools stated that they had no experience with production of CLIL materials, 7 teachers (31.81%) have ever used ready-made materials. The results show that only 5 teachers (22.72%) have tried to create their own materials for teaching vocabulary in physics and chemistry. The presumptions that most of the teachers would have hardly any experience with creating materials for a CLIL class were confirmed. According to their responses it is a demanding and time-consuming process. On the other hand, 15 teachers at bilingual secondary schools use some ready-made materials from the internet and 5 teachers tried to create their own materials.



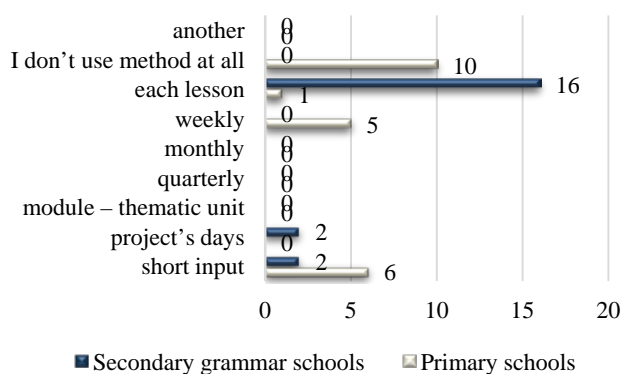
Graph 8: [Teachers' experience with CLIL materials production]

The thirteenth question dealt with inquiry what the teachers find the most problematic situation in the process of implementation of the CLIL method to teaching vocabulary in physics and chemistry. Survey at primary schools shows that most of the teachers (81.81%) suppose that the time-consuming preparation for a CLIL lesson would be the most problematic. Most of the respondents at primary schools (63.63%) find the lack of materials, bilingual dictionaries and didactic sources also problematic. The teachers place the worries about excessive difficulty for students and the lack of information about the way of using the CLIL method as another serious difficulty. One teacher finds the general misunderstanding of approach by parents and students as the most serious obstacle during the implementation of CLIL. The majority of teachers at bilingual secondary schools (90%) suppose that the time-consuming preparation for a CLIL lesson is the most problematic during the implementation of the CLIL method and 80% consider the lack of materials, bilingual dictionaries and didactic sources as a serious problem.



Graph 9: [Most problematic situations in the process of implementation CLIL method]

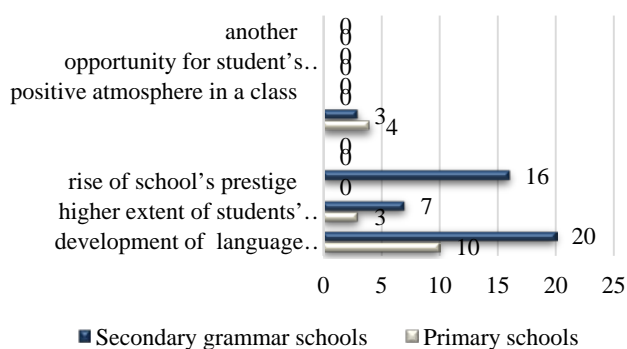
The results proceeding from the question on what form of the CLIL method the teacher respondents use in teaching vocabulary in physics and chemistry lessons and the frequency of its use were as follows: 45.45% teacher respondents replied that they did not use the method at all, 6 teachers (27.3%) used a short input and 5 teachers used this method weekly. There was only 1 teacher who used CLIL every day. She was the youngest teacher of all and she was at the advanced level of English. There is a considerable difference between primary schools and bilingual secondary grammar schools. Sixteen teachers at bilingual secondary grammar schools use CLIL method in every lesson, 2 teachers use short input and 2 use project's days.



Graph 10: [Frequency of using CLIL method in chemistry and physics lessons]

The purpose of the fifteenth question was to find out the benefit of using the CLIL method in education. This question was answered by 12 teachers at primary schools as they use CLIL method in fact and 20 teachers at bilingual secondary grammar schools. Teachers that did not use CLIL did not answer the question. Concerning the benefit of the CLIL method, 10 respondents came to an agreement that using the CLIL method was beneficial for the development of students' language skills. The progress of students' critical thinking was found as a second biggest benefit by 4 teachers. Three teachers found the higher extent of students' motivation and active involvement in education as third important benefit of the CLIL method. The fact that nobody chose the options such as positive atmosphere in a class as the benefit of the CLIL method was surprising.

All teachers at bilingual secondary grammar schools found development of students' language skills the most important, 16 teachers found the rise of school's prestige important, 7 teachers believed that CLIL method increases student's motivation and 3 teachers found the progress of students' critical thinking as other benefit.



Graph 11: [Benefits of using the CLIL method in education]

The last question was aimed at the fact if the respondents found the CLIL method beneficial and if they agreed with implementation of the CLIL method to schools. Two female teachers expressed their opinion that each extra form of education was beneficial for student's general range of knowledge. Other respondents were probably not willing to fill in the last question. Time-consuming filling in the questionnaire or absence of experience with the CLIL

method could cause that the respondents did not mention their opinions.

7. CONCLUSION OF THE SURVEY

To sum up the findings, the main aim of the survey was to verify existence of bilingual English/Slovak dictionary of natural sciences and find out if it was possible to develop students' language skills with CLIL method. Another goal of the survey was to gain a piece of information if the teachers knew and used the CLIL method in teaching vocabulary in natural sciences and if they considered the CLIL method beneficial in teaching vocabulary. As there was a questionnaire return only from teachers who responded to physics and chemistry, the results of the questionnaire were interpreted only with these two natural sciences.

The research shows that 71.4% of teachers at primary schools and 63.63% teachers at bilingual secondary schools do not use dictionary in teaching vocabulary of physics and 77.78% of teachers at primary schools and 85.7% teachers at bilingual secondary schools do not use dictionary in teaching vocabulary of chemistry. It is due to a lack of bilingual English/Slovak dictionaries of physics and chemistry. For all teachers (100%) at primary schools it is necessary to compile a bilingual dictionary. Some of the teachers tried to compile a bilingual dictionary but they had never completed it. They verify accuracy of using terminology mainly on the internet.

The respondents would have been more aware of the CLIL method's existence. Some of them applied the method in teaching vocabulary in physics or chemistry lessons. The survey shows that the majority of the respondents have ever heard about the method but not all of them have already applied it in teaching vocabulary in their subjects. The longest teaching practice of the respondents lasts twenty-seven years and the shortest period five years. However, teachers with longer practice are not willing to try new teaching methods and their level of English is lower in comparison with younger teachers.

The survey proves that most of the teachers agree with the fact that physics or chemistry is an appropriate subject to be taught through the CLIL method. This method could be used in teaching vocabulary in science. Moreover, 45 per cent of the respondents do not use foreign languages and materials in teaching vocabulary in physics or chemistry lessons. Most common reasons why foreign languages are not used in non-language subjects is the lack of time for integration of foreign languages and a lack of materials, bilingual physics and chemistry dictionaries and didactic sources.

The survey shows that the majority of respondents has not had any experience with the production of CLIL materials except of five teachers who have already tried to compile their own materials. According to the teachers' opinion the lack of qualified teachers and time-consuming preparation for a CLIL lesson is the most problematic during the implementation. Regarding frequency of using the method in physics or chemistry lessons more than 45% of the respondents do not use the CLIL method at all. Most of the respondents come to an agreement that using the CLIL method encourages the development of students' language skills. Teachers should apply the method in teaching vocabulary in physics or chemistry lessons because there are many materials in English available either on the Internet or in scientific books that could be used by teachers in the planning of a CLIL lesson. Students who would like to study physics or chemistry at university could benefit from the CLIL lessons and used gained knowledge during their studies.

According to the results from the survey it is apparent that teachers do not use dictionary in printed form in teaching physics and chemistry. They do not have at disposal any bilingual dictionary for physics and chemistry neither at primary schools nor at bilingual secondary grammar schools. Only a few teachers of all use bilingual dictionaries available on the internet. Two of them use bilingual English/Slovak dictionary of physics. There are approximately 4,000 Slovak physical terms and their English equivalents but disadvantage with this online dictionary is absence of explanation or definition of physical quantities. The dictionary was compiled by a Terminological commission of Slovak physical society in 2007 by Peter Čerňanský, Ivan Červeň et al.

The results of brief survey that were conducted in autumn 2019, present the existence of some specialised bilingual dictionaries available on the Slovak market. According to a search on the internet stores and internet websites there is no existence of a bilingual dictionary of physics or chemistry – see the table 1. The closest to these needs are the technical dictionaries and scientific-technical dictionary, however, they do not provide an optimum solution as their scope is not only physics or chemistry but also other different areas like architecture, biology, economics, geography, mathematics, agriculture (at least 30 fields).

Table 1: [Specialised dictionaries (English-Slovak and/or Slovak-English) available on the Slovak market]

Name of dictionary	Languages	Author(s)	Year of publication
Akademické pojmy pre vysokoškolákov	EN-SK, SK-EN	Marián Kika	2016
Ekonomický slovník	EN-SK, SK-EN	Jozef Magula	2004
Obchodný slovník	EN-SK, SK-EN	Jozef Magula	2003
Právnický slovník	EN-SK	Jozef Magula	2002
Slovník medicíny	SK-EN	T. Langová	2002
Slovník medicíny	EN-SK	T. Langová	2002
Slovník výpočtovej techniky	EN-SK, SK-EN	Daniela Magulová	2001
Strojárske slovník EÚ	EN-SK, SK-EN	John Smith	2019
Technický slovník	EN-SK, SK-EN	Ladislav Véhner	2004
Viacjazyčný slovník mobilnej pracovnej techniky	EN-DE-SK	Juraj Bukoveccky et al	2008
Výkladový slovník inteligentných dopravných systémov	EN-SK, SK-EN	Tibor Schlosser	2008

To conclude finding out: a special dictionary for natural sciences itself is absent on the Slovak market. The Slovak market offers only a dictionary for natural sciences being a part of other special dictionaries.

The results of research clarify that for all teachers (100%) it is necessary to compile a bilingual dictionary of physics and chemistry. A bilingual dictionary could help the teacher prepare better materials for their teaching more effectively and faster. It could be a helpful tool for pupils too.

The results of research clarify that for 10 teachers at primary schools (83.33%) and for all teachers at bilingual secondary grammar schools using the CLIL method is beneficial for the development of students' language skills. The progress of students' critical thinking is found as a second biggest benefit by 4 teachers at primary schools. Three teachers find the higher extent of students' motivation and active involvement in education as the third important benefit of the CLIL method and 16 teachers at bilingual secondary grammar schools considered a rise of school's prestige and competitiveness more important.

The project is aimed at studying the situation at secondary vocational schools, however, we found mapping the situation at bilingual secondary grammar schools interesting as a start. The project is not at the same time focused on primary education but we have found out that teachers start using the CLIL method at primary schools. These teachers are mostly the ones with English language specialisation. The next survey is predominantly going to be focused on secondary vocational schools in 2022.

8. CONCLUSION

There is a strong lack of systematic care and interence for national terminology in Slovakia. The survey revealed huge amount of unprofessionally formed new terms and massive borrowing from English. The huge risk is the subsequent use of inconsistent terminology in practice which is very difficult to eradicate and reflect the level of terminology culture. Every national terminology is a bearer of cultural, linguistic and conceptual values and during the translation and looking for an adequate equivalent across languages there is the contact mixing.

It is also necessary to keep in mind the different term formation across languages, diversity of conceptual systems, their relationships, variability of terms, consistency of terminology, historical traditions, preference for native language, the importance of team work of terminologists and specialists and ability of compromise.

The authors recognize the urgent need to tackle issues of terminology in building knowledge society in Slovakia. Also, they point to a lack of interest on terminology in public and government, and they call for urgent government assistance similar to that of Francophone countries.

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Sources

1. BYBEE, R. W. *Towards an understanding of scientific literacy*. In: Scientific Literacy: An international symposium, 1997. IPN, Leibniz-Institut für die Pädagogik der Naturwissenschaften, 1997. ISBN 3-89088-109-2.
2. CABRÉ, M. T. *Terminology. Theory, methods and applications*. John Benjamins Publishing Company, 1999. ISBN 90 272 16347.
3. ČÍBIKOVÁ, I. *Terminologická ne/gramotnosť a ne/kultúra na Slovensku*. In: Letná škola prekladu 12. Odkaz Antona Popoviča, zakladateľa slovenskej prekladovej školy – pri

- príležitosti 80. výročia jeho narodenia. 35. ročník. Zborník prednášok. Piešťany 18. – 20. októbra 2013. Bratislava: SSPUL, 2013. 82 – 100 p. ISBN 978-80-971262.2-3.
4. CÍBIKOVÁ, I. *Terminologická gramotnosť v odbornom cudzojazyčnom vzdelávaní*. In: Lingua summit 2009: Jazykové výzvy 21. storočia. November, 2009, Trenčín, SR. Trenčín: TNUAD, 2009. 37 – 41 p. ISBN 978-80-8075-438-9.
 5. COYLE, D., HOOD, P., MARSH, D. *Content and Language Integrated Learning*. Cambridge: Cambridge University Press, 2010. ISBN 9780521130219.
 6. COTSOES. *Recommendations for Terminology Work*. [online]. Berne: MediaCenter of the Confederation, 2002. 112 p. [cit. 2019.10.25]. Available on: <http://www.cotsoes.org/sites/default/files/CST_Recommendations_for_Terminology_Work.pdf>. ISBN 3-907871-01-4>.
 7. COTSOES. *Recommendations for Terminology Work*. Cotsoes Location: Berne, 2003. ISBN 3-907871-07-3.
 8. DALE, L., TANNER, R. *CLIL Activities. A Resource for Subject and Language Teachers* (Cambridge Handbooks for Language Teachers). Cambridge University Press, 2012. ISBN - 10 0521149843. ISBN 13 978-0194425780.
 9. DEBOER, G. E. *A history of ideas in science education: implications for practice*. New York: Teachers College Press, 2019. p. 32 (2):254-257, ISBN 978-0807730539.
 10. HOLBROOK, J., RANNIKMAE, M. *The meaning of scientific literacy*. International Journal of Environmental and Science Education, 2009. 4.3: p. 275-288. ISSN-1306-3065.
 11. HURD, P. D. *Science literacy: Its meaning for American schools*. Educational leadership, 1958. 16.1: p. 13-16.
 12. KARČOVÁ, A. *Jazyková kultúra na začiatku 3.tisícročia*. In: Slovenská reč, 2010, roč.75, č.3, Časopis pre výskum slovenského jazyka, available at: <<http://korpus.juls.savba.sk/Stachments/publications/2010-karcova-recenzia.pdf>>, p. 185-191. [online]. [cit. 2013-09-26].
 13. MARSH, D., LANGÉ, G. *Using Languages to Learn and Learning to Use Languages*. In: MILTON, James, *Measuring Second Language Vocabulary Acquisition*. Buffalo: Multilingual matters, 2009. p.13. ISBN 1847693784.
 14. MASÁR, I.: *Terminologická kultúra a komunikatívna efektívnosť*. In: Kultúra slova, č.4, 1997, available at: <<http://www.juls.savba.sk/ediela/ks/1997/4/ks1997-4.html>> [online] [cit. 2009-08-26].
 15. NEDOBITY, W. *The General Theory of Terminology: A Basis for the Preparation of Classified Defining Dictionaries*. Article in Dictionaries Journal of the Dictionary Society of North America, 1983.
 16. PAVEL, S., NOLET, D. *Handbook of Terminology*. Minister of Public Works and Government Services Canada. 2001. 154 p. ISBN 0-660-61616-5.
 17. PAVLÍKOVÁ, S. *Teaching vocabulary/Terminology*. 2020. [Master's Thesis]. University of Ss. Cyril and Methodius in Trnava. 173 p.
 18. ROBERTS, D. A. *Scientific Literacy: Towards Balance in Setting Goals for School Science Programs. A Discussion Paper*. Publications Office, Science Council of Canada, 100 Metcalfe St., Ottawa, 1983. ISBN 662-12533-9.
 19. SAGER, J. C. *Practical course in terminology processing*. Amsterdam: John Benjamins Publishing Company, 1990. 258 p. ISBN 9789027220769.
 20. STOFFA, J. *Terminologická gramotnosť a terminologická kultúra*. In: Terminologické fórum 2, Zborník z medzinárodnej vedeckej konferencie, december 8, 2008. Trenčín: TnUAD, FSEV, Katedra jazykov, 2009, elektronický optický disk. ISBN 978-80-8075-375-7.
 21. TENANT, T. *ESP bank: CLIL – Introduction Cross-curricular materials for teaching English*, 2005. [online]. [2007-02-04]. available at <<http://www.onestopenglish.com/section.asp?docid=144588>>.
 22. UNESCO. 2005. *Guidelines for Terminology Policies*. Paris: UNESCO, 2005. 39 p. [online]. [cit. 2019-10-06]. Available on: <<http://www.unesco.org/new/en/communication-and-information/resources/publications-and-communication-materials/publications/full-list/guidelines-for-terminology-policies-formulating-and-implementing-terminology-policy-in-language-communities/>>.
 23. WATERMAN, A. T. *National Science Foundation: A ten-year résumé*. Science, 1960. 131(3410): 1341-1354. ISSN: 00368075.

Standards

24. ISO 1087-1. *Terminology work – Vocabulary – Part 1: Theory and application*, 2000.
25. ISO 704: *Terminology work – Principles and methods*, 2009.