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**PECULIARITIES OF TEACHING SCIENTIFIC AND TECHNICAL TRANSLATION**

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**Abstract.** The purpose of the study is to analyze the organization of the educational process in the study of scientific and technical translation to the students in the areas of computer science, IT, communications technology, and automation technology. The article deals with the issues and methods of teaching translation of scientific and technical papers to engineering students from a linguistic point of view. The paper analyzes stylistic, lexical, and grammatical peculiarities of scientific and technical papers and ways of translation English terminology into Ukrainian language. The study of terminology peculiarities is based on the material of technical literature due to its extensive use in modern life and production. Special attention is paid to the principal characteristics and difficulties of such training. The basic problems that arise in teaching scientific and technical translation are analyzed. Moreover, the author succinctly outlined the key concepts in translation techniques.

**Key words:** scientific and technical translation, terminology,the information and communication technology terms, adequate translation

Throughout the history written and oral translation played a crucial role in human communication. In the conditions of radical changes in all spheres of human activity of the modern world caused by processes of globalization, development of professional communication on the Internet, enrichment of vocabulary of many languages, in particular English, the need for the improvement of a translation technique of professional texts increased significantly. The rate of exchange of scientific and technical information with other countries is increasing rapidly. As a result, the ability to translate a foreign language text is one of the major goals of teaching foreign language to engineering students. In the course of training a future expert in the areas of computer science it is required to provide the development of integrated professional and personal qualities, the most crucial of which is the cognitive independence. The linguists note that the importance of the ability to organize independent activities is most clearly defined in the process of spoken and written foreign language communication that implicates constant analysis of linguistic facts. Technical translation skills are necessary for senior students of engineering specialties.

Scientific and technical translation focuses on texts that are typically translated in the field of science and technology, such as technical instructions, data sheets, scientific research articles and abstracts, popular science press releases and news reports. It is considered one of the most difficult types of translation. This problem is due to the large number of requirements for such work. The texts of such a plan use a lot of specialized terminology , which is the principal difficulty of technical translation.

Another problem of technical translation is the need to combine knowledge of a foreign language with an excellent knowledge and understanding of the relevant field of technology in both the language of the source and target languages.

The basic feature of technical translation is the need for its high accuracy (equivalence). The technical translation should be as close as possible to the original source. The main goal of training technical translation skills is to teach students to convey any technical information into another language very accurately and clearly. Double meanings or distortions of meaning is not recommended. A slight deviation from the semantic content can have unintended consequences. Hence, unlike literary translation, technical translation does not allow any inaccuracies. Any deviation from the original text can be justified only by the peculiarities of the Ukrainian language, or the requirements of the style of translation.

Vocabulary selection should be carried out carefully and thoughtfully. When translating a scientific and technical text, various epithets are excluded. The phrase constructions must be logical and meaningful. Other requirements for technical translation include adequacy and informativeness. It is equally important to maintain the style of this type of texts considering not only vocabulary, but also the grammatical structure of the text and the presentation of the material.

One of the main tasks when translating text is to create an appropriate translation. The essence of translation adequacy is that the original text should be considered as a system, not as the sum of elements, as an organic whole, and not as a mechanical combination of components.[[1]](#footnote-1). The adequacy of translation is the result of a set of actions of correctly selected lexical, grammatical, and stylistic factors. The choice of lexical-semantic variants of a word (term) based on the study of its contextual connections and taking into account the pragmatic-communicative aspect of expression is the basis for correct translation[[2]](#footnote-2).

Translating computer terminology is extremely important. During practical classes in a foreign language students have the opportunity to work with technical texts that are rich in IT terminology. Inconsistencies in the translation of terms or errors can cause misunderstandings among professionals and, in general, affect the result.

When teaching technical translation, it is necessary to consider the fact that grammar is one of the basic tools that allows you to understand and, therefore, translate a text properly. The ability to analyze the grammatical structure of the sentence correctly, to determine the grammatical difficulties of translation, and to construct a sentence translation according to the norms of the language and genre of translation are the principal conditions for adequate translation of a foreign text[[3]](#footnote-3). The necessary grammar skills should be considered in relation to the translation of a scientific and technical text. That is why students are supposed to repeat the grammatical forms specific to scientific and technical literature; brush on the external and formal features by which they can be identified in the text.

It is recommended to remind students that both languages, English and Ukrainian, are known to belong not only to different branches of the Indo-European language family, but, moreover, they belong to different language structure types: the former is mostly analytical language, where grammar relations in the sentence are expressed by the means of free grammar morphemes, while the latter is a flexional language, where grammatical meaning and relations in the sentence are expressed by means of bound grammar morphemes, i.e. flexions. The grammatical structure of scientific texts is characterized by certain features that students should pay attention to:

* English scientific texts are full of compound and complex sentences. It should be noted that words that depend on the subject or predicate are often found at a distance from the main words. In such cases, students are asked to divide one large sentence into several meaningful small ones. If the meaning of the statement has not changed, then the sentence is translated correctly.
* a large number of impersonal verb forms (*having discussed the question, summing it up, to put it mildly, concerning all said above, etc)*;
* application of definitions formed by binding whole syntax groups (*Circulation induced effects* instead of *effects induced by circulation*);
* a large number of linking words. Students need to be aware that incorrect use of such words in English can completely change the meaning of what they are trying to translate.
* the use of passive constructions in English. English passive voice is used more frequently due to the various types of construction it occurs in. Whereas Ukrainian passive voice construction is formed only by transitive verbs requiring a direct object when used as an active voice structure. Thus, only one type of English passive construction has a direct correspondence in Ukrainian. But not all English direct passive constructions can be transformed into Ukrainian passive since the verb transitivity in English and Ukrainian does not coincide. It is necessary to focus students' attention on the ways of translating predicates in such sentences.
* omissions of certain function words (articles, auxiliary verbs) especially in tables, graphs, specifications
* the word combinations which are not connected among themselves by syntactic means, i.e., prepositions *to, of, from* and others. For example: *memory-resident software* - a program that is constantly in memory, *source transparent routing* - transparent routing from the source. Students' attention should be drawn to the fact that the key words in all the above terminological combinations are the last words, and all previous words serve as the definitions to them.
* tendency to nominalization. In English sentence the most important semantic part of a phrase is usually expressed by the nominal part of speech. It is preferable to say, ‘*he gave the coat a thorough shaking*’ instead of ‘*he shook the coat thoroughly’*. The high frequency of nominal constructions in the predicate makes a supposition that English is a static language because dynamism is usually expressed through the verbal predicates, which are less popular in English language.
* the author's language is usually built in the first-person plural: *we describe, we introduce, we are coming to realize, we have taken it to be, we deal with, etc.*
* depersonalization of the text. Most often it is realized in the text as follows: the author, mentioning himself, uses the expressions *the author, the research team or the article investigates…, the book focuses on…, and so on.*

Amongst the lexical difficulties of scientific and technical translation, the authors include especial terminology, neologisms, foreign words, abbreviations and acronyms, proper names and titles. Karaban calls it polysemantic and homonymous [[4]](#footnote-4). The fact is that in different fields of science and technology the terms can have completely different meanings depending on the context.

The translation of IT terminology requires appropriate knowledge in the field, as well as an understanding of English and Ukrainian terminology. Differences in the lexical and morphosyntactic structure of terms have objective linguistic reasons: English terms, the structure of which includes a substantive defining component (noun or noun group), cannot be translated into Ukrainian without differences in morphosyntactic structure due to differences in the grammatical structure of languages. When translating technical texts, the interaction of the term with the context is of great importance, due to which the meaning of the word is revealed[[5]](#footnote-5).

It's worth noting that many English terms no longer need to be translated because they have a common meaning: *disk, file, program*. There are also many borrowings: *Windows, e-mail, host*.

The translation of international vocabulary, which is widely used in technical texts, also causes some difficulties. International scientific vocabulary (ISV) includes scientific and professional vocabulary. The language of its origin may or may not be certain, but it is currently used in several modern languages. Many international words act as "false friends of the translator" because they are similar in form to Ukrainian words, but have different meanings (*bus, image, rating*). The translation of such words is complicated as forming word combinations they usually acquire a certain meaning which can be confusing. In general, the existence of the international vocabulary and borrowings can be misleading. The only way for a student to distinguish “false friends of a translator” from international vocabulary and borrowings is to learn and to know them.

Podgajska suggests to follow a certain scheme in order to avoid mistakes when translating such words:

1. Carefully study the semantic structure, meaning and examples of the use of the English word in the English dictionary;

2. Investigate all possible variants of word translation in the English-Ukrainian dictionary;

3. Carefully study the context in which the word is used;

4. Analyze the value of the selected translation option;

5. Check in the Ukrainian - English dictionary the ways of translating the selected equivalent of the translation from Ukrainian into English[[6]](#footnote-6).

The problem of interlingual homonymy between terms, which manifests itself in a significant number of "false friends of the translator", in particular, pseudo-internationalisms, without identifying which translator may lose the ability to provide adequate translation is of concern. When learning vocabulary, efforts should be directed to the processing of words that are often incorrectly translated due to ambiguity. It is necessary to compile the dictionaries of pseudo-internationalisms, prepare additional training materials, and suggest that students practice the development of translational skills, understanding, and correct use of interlingual homonyms. Errors can also be avoided by using relevant references.

Another peculiarity of technical translation of scientific texts is a wide range of specialized terms. The translation of such terms causes a number of problems, most of which are related to their identification, deciphering, and adequate reproduction. Language exercises for deciphering and reconstructing both simple one-word terms and complex terminological groups can help students to develop appropriate skills. Лавриненко has proposed a set of exercises to learn students to translate the terms and terminological phrases. These exersises can be based on the following tasks:

1) write out the terms related to its main subject;

2) give the definition of terms in native and foreign languages;

3) determine the subject area in which the terms are used;

4) form all possible derivatives of terms;

5) translate terms in context and justify the method of translation;

6) fill in the blanks with terms;

7) select equivalents of terms and terminological phrases;

8) distinguish between terminological and non-terminological meanings of the words[[7]](#footnote-7).

Translation skills are being formed gradually while students do the exercises, consisting of both exercises training translation skills (pre-translation exercises), and tasks where students translate texts of a certain volume and within a required period. The set of exercises is also characterized by a gradual growth of the complexity level. Pre-translation exercises can be divided into exercises forming general learning skills and those responsible for language skills. A typical example of a pre-translation exercise, forming the language skills, is a paraphrase exercise followed by translation. The following pre-translation exercises can be used:

 • lexical exercises comprising field-specific terms, names, etc.; search for equivalents of the active vocabulary according to the studied topics;

• grammatical exercises designed to detect specified grammatical phenomena;

• lexical and grammatical exercises may include exercises to identify discrepancies in the source and target languages, search for equivalents. Also, a student is required to find the specified grammatical phenomenon in the text and analyze the method of translation[[8]](#footnote-8).

The greatest difficulty for translation are the terms neologisms. Today, the English language is experiencing a so-called "neological boom" due to a huge flow of new words, especially those related to the field of information technology. On average, 800 new words appear in English each year, more than in any other language in the world. Therefore, dictionaries usually lag behind in fixing neologisms. To make the translation of such terms easier during the translation Lavrinenko O.O proposes to divide it into two stages: analytic and synthetic. The first involves either the translation of individual components of terms (if it is a complex term or terminological phrase), or contextual analysis; the second is the construction of terminological components depending on the semantic relations between them and the final decision on the method of translation. (Lavrinenko, 2011: 81)

In our opinion it is better not to use highly specialized scientific and technical terminology in the educational process. We recommend focusing on general scientific and general technical linguistic phenomena as we consider the skills of working with terminology in general more useful when working with any scientific and technical text.

We propose to divide the translation process into several stages:

1) the general evaluation of the text;

2) literal translation of incomprehensible parts of a sentence;

3) selection of the correct translation method;

3) adequate translation.

Most researchers (Karaban VI, Lavrinenko OO, Gotti M.) note the importance of choosing the appropriate method of translation. Translation of computer terminology can be performed using such methods as:

* transliteration (printer - принтер, file - файл, server - сервер);
* tracing or lexical copying (access code – код доступу, current drive – поточний дисковод, disk storage – дискова пам'ять);
* descriptive translation (software - програмне забезпечення, hosting (хостинг) - послуга з надання дискового простору для фізичного розміщення інформації на сервері, що постійно перебуває в мережі).

Simple sentences predominate in English scientific and technical texts. This phenomenon is not typical of the corresponding style in the Ukrainian language where complex sentences are widely used. Hence, translation often uses the technique of combining two or more simple sentences of the English original into one complex sentence of the Ukrainian language. Although at first glance such a translation may seem "free”, it is in such a translation that the unity of content and form is reproduced, the conformity of the style of the original is observed.

Thus, the teacher's task is to introduce the students to a technique or method of translation. The students should understand that the text of the translation must satisfy the generally accepted norms of the literary language, without using the syntactic constructions of the original language. Generally speaking, translation should neither be a direct retelling of the original text, nor should it be a free retelling of the original text, although the elements of both must exist. It is important not to lose the basic information of the original.

Summing up what has been said, one of the most important aspects of student learning is work aimed at improving the quality of translation, which is not only to teach students mastery of translation theory and technology, but primarily in the development of their ability to analyze the translated text. When evaluating the text of the translation, it is necessary to take into account whether it corresponds to the original, whether the information is fully transmitted, whether the author's communicative intention is realized, whether there are unjustified errors in the translation. In order to perform an equivalent, adequate, and complete translation, characterized by the absence of violations of language norms and grammar rules, in the process of working to improve the quality of translation, it is recommended to use the methods proposed in the article.

When teaching technical translation, it should be noted that the purpose of mastering the art of translation is not the transformation of the student into the professional translator but the formation of certain skills necessary for immediate understanding of a foreign text, the ability to interpret the text without translation into their native language with minimal reference to the dictionary. The translation of scientific and technical documentation is an essential part of the scientific information activities that helps to overcome language barrier.

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