

Scientific and Technical Texts: Translation Aspects in Electrical and Computer Engineering

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Purpose. The purpose of the paper is to study the lexical and grammatical levels of technical documentation in the English and Ukrainian languages, as well as to analyze the means of expression of English technical documentation in the Ukrainian language in the field of electrical engineering and computer technology in order to achieve adequacy. **Design / Method / Approach.** Research methods: theoretical study and analysis of literary sources on the problem of research; methods of linguistic analysis: descriptive and comparative methods, methods of classification and systematization. **Findings.** It has been established that cultural differences have a significant impact on the perception of technical information, which determines the need to carefully consider the context and cultural features of both the source and target audiences, **Theoretical Implications.** As a result of the theoretical analysis, various approaches to the translation of culturally specific information in the scientific-technical text were considered. Translation of technical texts is one of the most responsible types of translation. **Practical Implications.** The practical value of this study is that the obtained results can be taken into account and used for: a) solving current issues of bilingual communication, contributing to ensuring the compliance of scientific and technical terminology with international standards; b) provision of practical recommendations on the translation of technical documentation; c) development of special educational courses that cover the theory and practice of scientific and technical translation, as well as the creation of manuals and dictionaries of technical terminology. **Originality / Value.** The scientific relevance of the study consists in highlighting the methods of translation of scientific and technical terminology, which is constantly updated through productive means of word creation. **Research Limitations / Future Research.** The study can serve as a basis for further studies in this field and improve the methods of translation of scientific and technical vocabulary. **Paper Type.** Practitioner paper.

Keywords:

technical translation, terminology adaptation, cultural differences, lexical and grammatical analysis, scientific and technical texts, computer technology documentation

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Modern English scientific and technical literature are based on the norms of the English language with certain features. In particular: a large number of specialized terms and words of foreign origin are used; a detailed selection of lexical units is carried out for the most accurate expression of thought; special attention is paid to service words that provide a logical connection between individual elements of statements.

Scientific and technical texts refer to the scientific style and are used in the spheres of scientific activity, scientific and technical progress of society, education and training. All of the above-mentioned peculiarities determine the relevance of the research.

When translating scientific and technical literature, it is necessary to take into account that although the language of these texts is part of the national language and uses its lexical and grammatical set of expressions, it also has its own style, corresponding to the purpose and tasks of scientific style. The features of terminology and grammar, characteristic of scientific texts, determine it.

The language of scientific and technical literature is characterized by the use of a large number of terms, various abbreviations, the preference for some syntactic abbreviations over others, the peculiarities of the translation of certain grammatical constructions, the use of ellipsis to express thoughts, etc. One of the key stylistic features of scientific and technical literature is brevity in the presentation of material and clarity of wording.

Objective and tasks

The purpose of the paper is to study the lexical and grammatical levels of technical documentation in the English and Ukrainian languages, as well as to analyze the means of expression of English technical documentation in the Ukrainian language in the field of electrical engineering and computer technology in order to achieve adequacy.

This purpose required solving the following tasks: to analyze functional styles and linguistic means of their expression; to determine the main characteristics and features of scientific and technical texts; to analyze the functional purpose and main classifications of instructional texts; to determine the basic concepts of professional competence of future translators; to define the problems, lexical and grammatical features of scientific and technical terminology; to analyze the translational transformations of scientific and technical terminology from English to Ukrainian; to form recommendations on the translation of scientific and technical terms into Ukrainian.

Materials and methods

Research methods: theoretical study and analysis of literary sources on the problem of research; methods of linguistic analysis: descriptive and comparative methods, methods of classification and systematization. The main method, that is used for the research is the descriptive approach referring to the method of analyzing and documenting languages as they are actually spoken or written by native

speakers, without imposing prescriptive rules or judgments about correctness. Descriptive linguistics focuses on observing and recording the patterns and structures of language, including phonology (sounds), morphology (word formation), syntax (sentence structure), semantics (meaning), and pragmatics (language use in context).

This approach aims to describe languages objectively, without evaluating them based on any external standards or norms. Descriptive linguistics is often contrasted with prescriptive linguistics, which involves prescribing rules and norms for language use based on subjective opinions or social conventions.

As a scientific basis for the analysis of the use of translation tools in the process of translating English-language technical documentation, simple and complex terms, terms-phrases, abbreviations and syntactic structures in the fields of electrical engineering and computer technology were used.

Results: lexical peculiarities of scientific and technical texts

One of the main differences between the language of technical literature and the language of fiction is the high level of use of specialized terms in the text, which are often not even found in terminological dictionaries. With the development of scientific knowledge, the need for new definitions of concepts increases, which leads to the expansion of the vocabulary, the main part of which is defined by new terms. It is important to have deep knowledge of new terminology and to be able to express it accurately in the native language during the translation of scientific and technical literature. This is one of the key challenges in the process of such translation (Al-Abbas & Haider, 2021).

The main requirements for translation include:

1. Accurate reproduction of the content of the original text.
2. Clear expression of ideas in the shortest and most concise form, corresponding to the style of Ukrainian scientific and technical literature. It is important to avoid transferring the specific features of the English language, because the goal is to express ideas in the native language in a modern way, taking into account modern standards.

3. The translation must fully comply with generally accepted norms of the Ukrainian language. When translating, we should take into account the absence of some terms in the Ukrainian language and syntactic structures specific to English. It is also important to pay attention to the peculiarities of the location of semantic accents in sentences: the Ukrainian language is characterized by a strengthening of the semantic content at the end of the sentence, while the English language is characterized by a weakening of the semantic accent at the end. Thus, it is important to consider that the Ukrainian sentence emphasizes the last, while the English sentence determines the main emphasis at the beginning.

The language of scientific and technical literature is characterized by the absence of emotionality, figurative comparisons, metaphors, elements of humor, irony, and other means of expression (Al-Abbas & Haider, 2021).

Although the language of scientific and technical literature is characterized by a large number of special terms, it also includes a significant number of commonly used words and expressions. Polysyllabic words make up a large part of this vocabulary. Sometimes only grammatical features are not enough to accurately determine the meaning of a polysemantic word; it is also necessary to take into account its lexical connections (Hosshanthika, 2022). Thus, the reproduction of the meaning of the verb to suggest depends on whether the subject of the action performs the role of an animate or inanimate object. In the case of an animate one, it can be translated as *пропонувати* or *припускати*:

We suggest a new method of work.

Ми запропонували новий метод роботи.

In a situation where the object is inanimate, the appropriate translation of the word is *наводити на думку* or *дозволяти припустити*:

This evidence suggested that the acid was essential.

Ці дані дозволили припустити, що кислота необхідна.

In other cases, on the contrary, choosing the correct lexical meaning of a polysemantic word depends on taking into account its grammatical connections. For example, such meanings of the verb to assume, such as accept or acquire, appear when this verb is joined by an addition expressed by a noun:

All deposits of uranium will assume tremendous importance.

Усі поклади урану набувають величезного значення.

In the context of assuming or relying, the verb to assume is used in the objective infinitive inflection (in the complex subject), as well as before the object defined by the subordinate clause:

The most common alternating current for lighting is assumed to go through 50 cycles in 1 second.

Припускається, що для освітлення частіше всього використовується змінний струм 50 періодів за секунду (50 Гц).

We assume the compressor to be adaptable to any power source.

Ми припускаємо, що компресор можна пристосувати до будь-якого джерела енергії.

When translating scientific and technical literature, it is recommended to follow the sequence of work with the text:

1. Familiarize yourself with the text or a separate paragraph, try to understand its general meaning.

2. Consider each complex sentence separately, breaking it into simple parts: complex sentences – into main and subordinate clauses, and complex sentences – into simple sentences.

3. When analyzing complex sentences, where their constituent elements can be immediately identified, it is recommended to find the predicate of the main and subordinate clauses.

4. In each sentence, determine the predicate group, and then find the subject group and the object group.

5. To start translating a sentence, you should define the group of the subject, and then move on to the translation of the group of predicate, object and circumstances.

6. When looking up unknown words in the dictionary, it is recommended to predict their part of speech in a sentence. In this case, one should refrain from choosing the first meaning of the word, and instead familiarize oneself with all the meanings of this part of the language and choose the most appropriate meanings for the context for the translation of the text.

Different approaches can be used when translating scientific and technical literature:

1. Translation based on equivalents available in the Ukrainian language, i.e. stable and appropriate correspondences between the two languages, which, in most cases, do not depend on the context. For example: viscose – *віскоза*; cedar – *кедр*; heating – *нагрів*; loss – *втрата*.

2. The use of analogs in translation, which involves the use of words from the synonymous series. In such situations, one foreign word may have several Ukrainian equivalents, for example: bunching – *групування, варіювання, збирання, накопичення*; allowance – *дозвіл до чого-небудь, допущення*.

It is necessary to choose the option from this series that best fits into the specified context.

3. Calculation or literalness of the translation includes the transmission of an English word or expression by its exact reproduction by means of the Ukrainian language, for example: multistoried – *багатопверховий*; motor convertor – *двигун-перетворювач*; superpowersystem – *надміцна система*; sky-scraper – *хмарочос*.

During the literal translation of the sentence, no rearrangements occur; the sentence structure is preserved, and each word is translated as it appears in the dictionary (taking into account the context). Literal translation is used when most of the English words in the sentence have equivalents in the Ukrainian language, and when the structure of the sentence fully corresponds to the Ukrainian language.

Radio men well know that alternating current is the very current that makes radio possible.

Радисти добре знають, що змінний струм – це той самий струм, який робить можливим радіоз'язок.

But it is not always possible to translate literally.

Before the coming of rail way and the steam ship the volume of world trade was very small compared to what it is today.

До виникнення залізних доріг та парових суден обсяг світової торгівлі порівняно із сучасним обсягом був незначним.

The literal translation for this sentence is incompatible with the norms of the Ukrainian language, and the word coming cannot be translated by the word *приход* in this sentence. It is recommended to choose one of the possible answers for the word coming. The nouns railway, steamship must be given in the plural, which is more suitable for the Ukrainian language.

However, there are situations when an English word has an analogue in Ukrainian, but the context does not allow using any of the definitions given in the dictionary. In this case, it is necessary to check whether the context gives the sentence an additional nuance that is not found in the words from the dictionary, and

to choose a complete version of the translation that corresponds only to a specific case (Ihnatiuk, 2022).

The verb to telescope in different meanings corresponds to the Ukrainian words with the meaning to fold, to compress, but none of these meanings is suitable for translating the word in a sentence.

Time is a remarkable thing for any measurement, but it telescopes when events come quickly one after another.

Час – чудова річ для будь-яких вимірювань, але він скорочується, коли події проминають швидко одна за іншою.

4. For English words that do not have lexical equivalents in the Ukrainian language, a descriptive translation can be used. This involves conveying the meaning of an English word using a more or less common explanatory formulation.

For example:

a) prompt-period accident *можна передати лише описовим перекладом – аварія, пов'язана з переходом реактора до моментально-критичного режиму;*

b) standard performance – *стандартний показник ефективності робітника, який необхідно досягти для виконання завдання за одну годину, визначений для виконання норми.*

Descriptive translation is also used to explain newly created words. When translating words that are not in the dictionary, it is necessary to determine their meaning according to the context, while taking into account the word-forming elements of the given word and the main means of forming new words (Maksymenko et al., 2023).

5. Transliteration is the process of translating Ukrainian writing into English using letters, regardless of the pronunciation of the English word. To use transliteration, you can even not know the pronunciation of an English word, because it is enough to limit yourself to visual perception: retarder – *ретардер*; transposition – *транспозиція*; irradiation – *ірадіація*; maser – *мазер*.

The transposition technique can be used when the concept highlighted in the English text evokes associations that are closely woven into the Ukrainian reader's imagination. In cases where this does not happen, the transliteration should be accompanied by an appropriate note that explains the essence of this concept:

Airlift – ерліфт (пневмопіднімач); computron – компутрон (багатоелементна лампа для лічильних обладнань).

However, it is important to remember that when transliterating, the English names are often pronounced differently than in their native language, and the English people may not understand them. Frequent use of transliteration can lead to "pollution" of the Ukrainian language and make it difficult to better understand the essence of the original.

7. Transcription consists in reproducing the pronunciation of an English word using the letters of the Ukrainian alphabet, that is, transferring its phonetic sound.

White spirit – *Уайтспірит*; fan – *фен*; Whitehall – *Уайтхол*.

Transcription is the main method of translating names and titles, which, like transliteration, is used in cases where it is necessary to preserve the brevity and specificity of a foreign word. In cases where these stylistic expressions are not

decisive, it is more appropriate to use a descriptive translation, since transcription creates a new lexical element that can be unpredictable for the reader.

Results: grammatical peculiarities of scientific and technical texts

In addition to lexical conversion, grammatical methods of translating the original text are also widely used. This includes the following grammatical and syntactic transformations: addition, deletion, replacement of parts of speech, replacement of state, change of word order, syntactic assimilation, sentence segmentation, sentence combining, model sentence replacement, model sentence replacement. A grammatical shift in translation occurs when the grammatical structure of the source sentence differs from the structure of the target language, and the linguistic tradition of the target space requires such changes and agreements (Moskaliuk, 2020).

Therefore, we would like to emphasize that when translating into Ukrainian, it is necessary to ensure maximum adaptation to the English text in accordance with all linguistic norms and stylistic features of the Ukrainian language. Thus, the reader can easily and effectively familiarize himself with the text content of the document, analyze them and practically follow these texts. In addition, it should be noted that mainly in order to achieve an adequate translation, the translation is complex and complementary, i.e. in one sentence several translation techniques are used at the same time. Consider the following example:

Do not exceed the maximum water level indicated in the inner pot to prevent overflow.

Для запобігання переповненню не наливайте води вище максимального рівня, який вказаний у внутрішній каструлі.

The translator resorted to grammatical substitution – the substitution of a part of speech: the verb to prevent was replaced by the noun prevention. Thirdly, the lexical unit maximum in the Ukrainian version is reproduced using adaptive trans-coding. In addition, the sentence has changed even at the syntactic level due to the observed use of permutations. Therefore, among the transformations of grammar and syntax, the most specific weight is occupied by the replacement of parts of the language and the assimilation of syntax. The frequency of use is accompanied by a change in word order and addition. Substitution of sentences and conjunction of sentences are less often used.

When translating manuals for example for the use of household appliances, we can use the style and approach of technical translation. In order to perform their work effectively, translators must fully understand the source language and the target language, possess basic subject knowledge, and develop in the field of translation studies to acquire the necessary skills and abilities. Note that translation is also open to innovation. Today, technical translation encompasses the application of machine translation systems and translation automation systems. However, such an activity requires not only a lot of energy and time, but also

concentration and thoroughness, as translators will face many problems and difficulties in their work. First of all, it is necessary to remember that the operating texts are characterized by stamps, jargon, various abbreviations, etc. In addition, complications during translation can be factors such as time, deadlines for submission of finished materials or working conditions of the translator. In order to avoid any problematic situations, it is extremely important to know the details of reproduction that are characteristic only of such texts (Novikova & Suima, 2024).

In the course of the study, a transformational analysis was carried out, which revealed the use of lexical, grammatical and syntactic transformations of the translation. When reproducing texts for using household appliances in lexical transformations, tracing paper, texts, antonyms, descriptive translation are most often used. Grammatical transformations include replacement of parts of speech, replacement of status categories, additions. At the syntactic level, translators use more techniques of changing word order, syntactic assimilation, and sentence structure. However, not all explanatory texts have the correct translation, as there are many lexical-grammatical and stylistic errors (Suima, 2024).

During the research, it was determined that grammar and vocabulary in scientific and technical literature have their own unique features that distinguish them from the general language norm. Scientific and technical literature is characterized by the use of specialized terminological apparatus, technical accuracy and objectivity of speech. It is noted that the use of scientific and technical language requires from the author not only deep knowledge in a specific field, but also the ability to clearly and succinctly express his thoughts. The analysis of grammatical structures and lexical means allows us to identify trends in the use of linguistic means in scientific and technical literature and reveal their influence on the understanding of texts.

Conclusions

It was found that the effective use of grammatical and syntactic transformations in the translation of texts is important for ensuring a high-quality and understandable text. They allow you to adapt the language material to the cultural and linguistic characteristics of the target audience, making it easier to understand the texts. Secondly, the study of various types of grammatical and syntactic transformations, such as addition, deletion, replacement of a part of speech, replacement of state, change of word order, made it possible to determine optimal translation strategies to increase the comprehensibility and accuracy of texts. In general, it can be concluded about the importance of studying and using grammatical and syntactic transformations when translating texts for the use of household appliances as a key element of improving the quality and efficiency of communication in this specific genre of texts.

As a result of the analysis of texts for household appliances, a number of features were revealed that affect the quality and comprehensibility of the translation into Ukrainian. An important part of the work was the definition of strategies and methods that contribute to the high-quality translation of texts. The study

also takes into account the cultural and psychological aspects of translation, balancing technical accuracy and accessibility for different categories of consumers, as they affect the user's perception of information. A balanced consideration of technical accuracy for different categories of consumers is important.

In the second chapter, it is emphasized that the effectiveness of translation tools makes it possible to significantly facilitate the process of adapting technical documentation, however, it is important to emphasize that caution is necessary when using these tools, since technical specificity can lead to inaccuracies and inaccuracies in translation. The study emphasized the importance of understanding the context and specificity of terminology in the fields of electrical engineering and computer technology.

As a result of the conducted research, dealt with the peculiarities of the reproduction of culturally specific information during the translation of technical texts from English to Ukrainian, a number of important aspects that affect the quality and efficiency of the translation were revealed. It has been established that cultural differences have a significant impact on the perception of technical information, which determines the need to carefully consider the context and cultural features of both the source and target audiences, it is emphasized that the effective translation of technical texts requires not only accuracy in the transmission of terminology, but also adaptation its to the cultural context.

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