IRSTI 16.21.33 https://doi.org/10.26577/EJPh2025200424

A.U. Zhussupova[1]* , G.K. Kazybek[2]

[1]Abai Kazakh National Pedagogical University, Almaty, Kazakhstan
[2]Al-Farabi Kazakh National University, Almaty, Kazakhstan
*e-mail: zhussupova.akb@gmail.com

TRANSLATION PECULIARITIES OF TECHNICAL TEXTS: CHALLENGES AND STRATEGIES

In the age of technological development, the accurate translation of technical texts is crucial for international cooperation. This article is devoted to the challenges and strategies of technical translations between the English, Russian and Kazakh languages. The aim of the study is to identify how scientific meaning is preserved, adapted or slightly modified across languages. Qualitative, descriptive and comparative methods of research were used to analyze the examples taken from the book "Practical Electronics for Inventors" and their Russian and Kazakh translations. The analysis mainly focused on technical terms, complex noun phrases, symbols of technical discourse.

According to the results of the research, literal translation dominates in the translation of technical terms. Literal translation ensures accuracy and consistency. Modulation and transposition are used to achieve grammatical coherence in the target language. In Kazakh translations the meaning is often adapted to fit the natural flow of the language. In Russian translations small clarifications are added to meet academic style requirements.

Theoretically, this article contributes to translation studies by discussing the methods used by translators in multilingual technical context. Practically, it offers guidance for translators training. The insights can assist in improving the quality of technical translations in both professional and educational context.

Keywords: technical translation, translation strategies, literal translation, multilingual translation, terminology management.

А.Ө. Жүсіпова[1]*, Г.Қ. Қазыбек[2]

[1]Абай атындағы Қазақ ұлттық педагогикалық университеті, Алматы, Қазақстан
[2]Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан
*e-mail: zhussupova.akb@gmail.com

Техникалық мәтіндерді аударудың ерекшеліктері: мәселелер мен стратегиялар

Жаһандық технологиялық дамудың аясында техникалық мәтіндерді дәл әрі нақты аудару – халықаралық ынтымақтастық пен білім алмасуды қамтамасыз етуде маңызды рөл атқарады. Бұл зерттеуде ағылшын тілінен қазақ және орыс тілдеріне техникалық мәтіндерді аудару барысында туындайтын мәселелер мен қолданылатын стратегиялар талданады. Зерттеудің мақсаты – ғылыми мазмұнның түрлі тілдерде қалай сақталып, бейімделетінін немесе ішінара өзгеріске ұшырайтынын анықтау. Осы мақсатта "Practical Electronics for Inventors" кітабынан таңдап алынған үзінділер мен олардың қазақ және орыс тілдеріндегі аудармалары сапалық, сипаттамалық және салыстырмалы әдістер арқылы талданды. Зерттеу барысында техникалық терминологияға, күрделі атаулы тіркестерге, символдық белгілерге және техникалық дискурсқа тән синтаксистік құрылымдарға ерекше назар аударылды.

Зерттеу нәтижелері стандартталған терминологияны аударуда дәлме-дәл аударма басым екенін көрсетті, бұл аударманың нақтылығы мен бірізділігін қамтамасыз етеді. Ал грамматикалық үйлесімділік пен аударма тілінің табиғи ритмін сақтау үшін модуляция мен транспозиция жиі қолданылады. Қазақ тіліндегі аудармалар, әдетте, ана тілінің синтаксистік нормаларына сай семантикалық бейімдеулерді қолданса, орыс тіліндегі аудармалар академиялық талаптарға сай болу үшін нақтылаушы элементтерді жиі енгізеді.

Теориялық тұрғыда бұл зерттеу көптілді техникалық аударма үдерісінде шешім қабылдау механизмдерін ашып көрсету арқылы аударматану саласына маңызды үлес қосады. Ал практикалық жағынан бұл жұмыс аудармашыларды даярлау ісіне көмектесіп, стратегияларды икемді таңдаудың, контексті ескерудің және терминологияны тиімді басқарудың маңыздылығын айқындайды. Алынған нәтижелер кәсіби және білім беру салаларындағы техникалық аудармалардың сапасы мен сенімділігін арттыруға ықпал ете алады.

Түйін сөздер: техникалық аударма, аударма стратегиялары, дәлме-дәл аударма, көптілді аударма, терминологияны басқару.

А.У. Жусупова[1*], Г.К. Казыбек[2]
[1]Казахский национальный педагогический университет имени Абая, Алматы, Казахстан
[2]Казахский национальный университет имени аль-Фараби, Алматы, Казахстан
*e-mail: zhussupova.akb@gmail.com

Особенности перевода технических текстов: проблемы и стратегии

В условиях глобального технологического развития точный перевод технических текстов имеет ключевое значение для международного сотрудничества и передачи знаний. В данном исследовании анализируются проблемы и стратегии перевода технических текстов с английского на русский и казахский языки с целью выявления способов сохранения, адаптации или умеренной модификации научного смысла при межъязыковом переходе. Для этого применялись качественные, описательные и сравнительные методы анализа выбранных отрывков из книги «Practical Electronics for Inventors» и их переводов на русском и казахском языках. Особое внимание уделялось технической терминологии, сложным именным конструкциям, символической нотации и синтаксическим структурам, характерным для технического дискурса.

Результаты показали, что при передаче стандартизированной терминологии доминирует дословный перевод, обеспечивающий точность и последовательность, тогда как для достижения грамматической связности и естественного звучания целевого языка часто применяются модуляция и транспозиция. Казахские переводы, как правило, используют семантические адаптации, соответствующие нормам родного синтаксиса, в то время как русские переводы нередко включают разъясняющие элементы для соответствия академическим стандартам.

С теоретической точки зрения данное исследование вносит значимый вклад в переводоведение, раскрывая особенности процесса принятия решений при многоязычном техническом переводе. Практическая значимость работы заключается в том, что она способствует улучшению подготовки переводчиков, подчеркивая важность гибкого выбора стратегий, учета контекста и эффективного управления терминологией. Полученные результаты способны повысить качество и надежность технических переводов в профессиональной и образовательной сферах.

Ключевые слова: технический перевод, стратегии перевода, дословный перевод, многоязычный перевод, управление терминологией.

Introduction

In today's fast-changing world of technological innovation, the accurate translation of technical texts plays a crucial role in ensuring effective international cooperation and product accessibility. Technical translation refers to the process of transferring specialized information from fields such as engineering, information technology, medicine, and the natural sciences from one language to another. It's not enough to be fluent in a language, translators also need a strong understanding of the topic, and the specialized terminology used in the field.

The roots of technical translation run deep in history. Ancient Sumerian-Eblaite clay tablets already contained bilingual glossaries, showing that translation has always been part of humanity's search for knowledge (Delisle, 1995: 7). In fact, scientific and technical translation is just as old as religious translation, supporting almost every major discovery and technological advance throughout history (Byrne, 2012: 7-9). A turning point came in the 15th century with Gutenberg's printing press, which made books easier to produce and spread. This not only increased access to scientific knowledge but also raised the standards of translation by promoting greater accuracy and consistency (Byrne, 2012: 20-25).

The relevance of technical translation is evident, especially in fields where even a minor misinterpretation can lead to serious consequences. For example, in the medical field, an inaccurately translated instruction or equipment manual can endanger lives; in engineering, a mistranslation in a design specification may cause costly delays or system failures (Montalt, 2014). Moreover, as digital transformation keeps growing, technical translation becomes increasingly important in helping people share knowledge, work together across borders, and access new ideas and innovations.

It should be noted that technical translation poses significant challenges. Technical texts are characterized by specific terminology. Terms may have multiple meanings or no direct equivalents in the target language. Preserving semantic and functional accuracy in such cases requires not only linguistic skill but also deep contextual awareness. As Krein-Kühle notes, technical compounds are among the most challenging elements to translate, due to the complex semantic relationships between their components, making their translation "a very creative performance"

(Krein-Kuhle, 2003: 267). In many cases, translators must consult subject-matter experts. Furthermore, technical texts often contain complex sentence structures, abbreviations, and grammatical constructions that require special attention during translation.

N.K. Garbovsky notes that the translation of highly specialized material – whether technical, legal or medical – demands not only accuracy but also a stable and consistent use of terminology. He emphasizes that such texts should avoid subjective interpretations or figurative expressions, since even a small deviation may alter the intended meaning or mislead the reader. When approaching this type of translation, the translator must keep in mind the genre of the text, its communicative aim and the characteristics of its audience. For these reasons, Garbovsky considers technical translation to be a particularly complex and intellectually demanding activity (Garbovsky, 2007: 7-10).

Byrne expresses a related view, although he highlights a different aspect. Scientific writing may include theoretical reflection or even metaphorical language, whereas technical documentation is created primarily to communicate information in a clear, straightforward way. This functional distinction implies that the translator needs to consider the communicative task of the text and choose translation strategies that support it (Byrne, 2012: 1-3).

Today, technical translation accounts for most of the global translation activity. Some estimates suggest that scientific and technical texts make up nearly 90% of translation output worldwide, reflecting the centrality of translation to international trade, industry, and knowledge exchange (Kingscott, 2002).

Despite the growing demand for technical translation, research on this subject remains surprisingly limited. Jody Byrne emphasizes that "Technical translation has traditionally been regarded as the poor cousin of 'real' translation" (Byrne, 2006: 1). Most experts have often paid more attention to literary or film translation, leaving technical translation in the background. Most previous studies have tended to focus narrowly on terminology or on specific tools like translation memories and machine translation. However, these views do not really reflect the complexity of today's technical translation. The gap between theory and practice shows that we need updated research that reflects how the profession is changing. As Byrne points out, technical translation "offers far more theoretical potential than is commonly assumed", especially when it is viewed through communication theory and text typology (Byrne, 2006: 1).

Taking these points into consideration, this article explores what makes technical translation distinct by looking at its key challenges and offering strategies for addressing them. Using examples from English, Russian and Kazakh, it aims to present a balanced mix of practical insight and theoretical reflection on how meaning can be conveyed accurately and fluently across languages in technical context.

The object of the research is technical translation as both a linguistic process and a communicative activity. The subject of the research is the set of strategies and challenges involved in the translation of technical terminology from English into Russian and Kazakh. The aim of the study is to identify how scientific meaning is preserved, adapted or modified across languages. The main tasks include analysis of translation strategies, comparison of approaches in Russian and Kazakh and evaluation of how effective they are in maintaining meaning and clarity. The methodology of the research is based on qualitative, descriptive, and comparative analysis of selected technical texts. The hypothesis is that Russian and Kazakh employ systematically different translation strategies due to differences in structure, style and academic norms. The significance of this work lies both in its theoretical contribution to translation studies and in its practical value for improving translator training and enhancing the quality of technical translations.

The research question is: How can the scientific meaning of English technical terminology and complex syntactic structures be conveyed most accurately and consistently in Russian and Kazakh without compromising clarity or disciplinary conventions? This question serves as a central one in the comparative analysis and determines the choice of translation strategies discussed in the article.

Materials and methods

Qualitative, descriptive and comparative research methods were used in this research. By means of them linguistic and stylistic features in technical translation were analyzed. The main research materials are the chapters from "Practical Electronics for Inventors" (4th edition) by Paul Schers and Simon Monk. This is a widely used reference in electronics and electrical engineering which is known for its clear technical explanations and use of precise terminology. The Russian translation by S. Taranushenko was used as a primary source for analysis of translation strategies in Russian. A Kazakh transla-

tion was performed by the authors for carrying out a comparative analysis across English, Russian and Kazakh.

In total, approximately 40 pages of the book were analyzed, covering more than 150 instances of technical terms, noun compounds, and complex syntactic structures.

The analysis focused on specific linguistic features and common challenges in technical translation, particularly in the field of electronics. The following aspects were examined: Technical terminology and its equivalents in Russian and Kazakh; Sentence structure, especially the use of passive constructions and long noun phrases; Noun compounds and how they are rendered in target languages; Consistency and clarity of translated terms and explanations.

The study was grounded in Jean-Paul Vinay and Jean Darbelnet's model of translation strategies, with a particular focus on transposition, modulation, and equivalence. Additionally, elements of Peter Newmark's communicative and semantic translation framework were considered to assess how translators balanced precision with readability.

Hypothesis: It is assumed that Russian translations tend to rely on more literal strategies, whereas Kazakh translations, due to structural and cultural differences, more frequently employ modulation and adaptation.

Stages of research:

- selection of research material (chapters from Practical Electronics for Inventors and its Russian translation);
- production of a Kazakh translation of selected excerpts by the authors;
- identification of key linguistic features (terminology, noun compounds, sentence structures);
- comparative analysis across three languages using translation theory frameworks;
- interpretation of findings in terms of strategies and their effectiveness.

The degree of prior research in this field remains limited: while technical translation has been studied extensively between English and Russian, there is little research involving Kazakh, particularly in a trilingual comparative context. This study therefore introduces novelty by including original Kazakh translations for systematic comparison.

Literature review

The field of technical translation has long attracted scholarly attention, yet several important questions remain unresolved. Classical works by Vinay and Darbelnet, as well as by Newmark, still serve as a basis for modern research, since they propose approaches that are applicable even today. Vinay and Darbelnet's system of translation strategies – literal translation, transposition, modulation and equivalence – offers practical tools for describing how meaning and form shift when moving between languages (Vinay, 1995). Newmark takes a slightly different angle, distinguishing between semantic and communicative translation and stressing the importance of accuracy in technical texts (Newmark, 1988).

These foundational ideas have been further developed in more practice-oriented studies. Byrne, for example, focuses on how a translator can balance precision with clarity and how much the final text should be adapted to the needs of its intended users. Krein-Kühle, on the other hand, examines the notion of equivalence and how specialized terminology complicates it (Byrne, 2012; Byrne, 2006; Krein-Kuhle, 2003). Montalt and González Davies add a pedagogical perspective, particularly in the context of medical translation, demonstrating that subject-area training can significantly improve the translator's ability to produce consistent and reliable results (Montalt, 2014).

Recent research highlights that neural machine translation (NMT) has fundamentally reshaped both professional translation practice and translator training. Tavares et al. demonstrate that students increasingly rely on NMT and post-editing, which complicates the assessment of translation competence in higher education. Their study argues for the integration of indirect tasks such as paraphrasing and error-detection to foster creativity and problem-solving skills. This aligns with broader discussions in translation studies on how NMT not only supports technical translation but also challenges traditional pedagogical approaches and evaluation methods (Tavares, 2023). A. Pym discusses the role of translation in global communication, noting the growing intersection of technical translation, localization, and intercultural communication (Pym, 2018). These studies underscore the increasing complexity and interdisciplinarity of technical translation today.

Russian scholars such as Garbovsky, Fedorov and Komissarov also made a significant contribution to the theory of technical translation, although each approaches the topic from a slightly different angle. For example, Garbovsky (2007) examines how a translator works with the structure and purpose of a text, while Fedorov proposes a fairly prac-

tical division of texts into scientific or informational, socio-political and literary (Fedorov, 2002). In scientific and technical materials, he stresses the need for precise terminology and for keeping the syntax strictly controlled. Komissarov, in turn, pays more attention to the functional and genre-stylistic side of translation and notes that the main task in technical translation is to render the content accurately without introducing unnecessary stylistic colouring (Komissarov, 2000). Altogether, these authors show that successful technical translation depends not only on the linguistic form but also on the function of the text, its subject domain and the needs of its intended audience.

In the Kazakhstani context, issues of technical translation are primarily raised in works devoted to terminology. Here, we can note the works of such scholars as A. Tarak, Sh. Kurmanbayuly, and A. Kaidar. Tarak notes that technical texts have their own familiar style, their own system of terms, and their own characteristics of textual organization. When translating technical texts, one dictionary is not enough – the translator must rely on both professional knowledge and practical experience. Such texts are distinguished by their strict morphological and syntactic structure, stable speech patterns, and uniform style. Since the translation of technical works requires interdisciplinary training, it is advisable to entrust such texts to qualified specialists (Tarak, 2008: 57).

Sh. Kurmanbayuly, analyzing the situation in our society, notes the following: “When it is necessary to choose one of the variants of a term – in a foreign language, Russian, or Kazakh – in most cases, priority is given to the Russian variant, or the translation is done through Russian” (Kurmanbayuly, 2005: 29). This trend is a legacy of Soviet language policy. In the 1990s, academician A. Kaidar emphasized the need to translate terms borrowed from Russian into Kazakh or to find national equivalents for them (Kaidarov, 1993). However, even today it is known that the translation of terms is often done through the Russian language.

The work of Zh.N. Kuzar and G.I. Kuldeeva can be mentioned as well. The scholars consider terms from engineering networks and the construction industry as objects of translation and compare them in English, Kazakh, and Russian. The authors show that a significant part of the terms enter the Kazakh language not directly, but through Russian. The study describes in detail the main methods of transferring terms – calquing, transliteration, and descriptive translation, with the choice of strategy directly linked to the presence or absence of an established Kazakh equivalent. At the same time, the requirements for a term (unambiguity, accuracy, correspondence to the concept) are discussed, and it is emphasized that working with technical terminology places high demands on the translator’s terminological competence (Kuzar, Kuldeeva, 2023: 40-47). The observations of these authors correlate well with the conclusions of this study: Kazakh translations do indeed more often use semantic adaptation and descriptive solutions, while the Russian tradition relies more on established standardized equivalents.

Despite these advances, significant gaps remain. Most studies either focus narrowly on terminology or on technological tools, without providing a comprehensive comparative perspective across multiple languages. Comparative analyses of English – Russian – Kazakh technical translation are scarce. The present study addresses this gap by examining strategies for translating technical terminology, complex sentence structures, and symbolic notation across these three languages, with a focus on preserving accuracy, readability, and alignment with linguistic and cultural norms.

A distinctive feature of this study is the systematic comparison of English, Russian and Kazakh technical translations based on parallel examples taken from the same source text. Previous studies have typically looked at terminology or specific translation tools in isolation. Another contribution is the identification of how the same technical constructions give rise to different translation decisions in Russian and Kazakh languages due to differences in syntax, scientific style, and established terminological norms. The study also includes original Kazakh translations, created specifically for analytical purposes, allowing for the exploration of features not considered in previous studies. Taken together, these elements provide a clearer understanding of how translation strategies function in the three languages and reveal patterns that have not previously been clearly documented.

Results and discussion

The present section outlines the main findings of the translation analysis conducted on selected technical texts related to electrical engineering. The examples are taken from authentic scientific texts in the English-language textbook translated into Russian and Kazakh. Each example illustrates how Russian and Kazakh translators employ dif-

ferent strategies to render the same source text into their respective linguistic and scientific traditions. These strategies include literal translation, modulation, transposition, and semantic adaptation. The analysis pays particular attention to how accurately meaning is conveyed, whether scientific integrity is preserved, and how cultural or stylistic conventions shape translation choices. The comparison shows the similarities and differences between Russian and Kazakh approaches to technical translation.

Original: Electric current is the total charge that passes through some cross-sectional area A per unit time (Scherz, 2016a: 6).

Translation by S. Taranushenko: Электрический ток – это общий заряд, проходящий через определенную площадь поперечного сечения S за единицу времени (Scherz, Taranushenko, 2018: 24).

Translation by the authors: Электр тоғы – бұл бір уақыт бірлігі ішінде көлденең қиманың белгілі бір ауданы арқылы өтетін жалпы заряд.

The Russian version of the term follows what Vinay and Darbelnet describe as the literal translation strategy. In their model, this strategy is used when the translator can reproduce the structure of the original text without altering its grammatical logic or conceptual content. Technical terminology, in particular, often lends itself well to this approach because the terms already have established and widely accepted equivalents in the target language (Vinay, 1995: 86).

In this case, "cross-sectional area" is translated as "площадь поперечного сечения". This choice is not only a direct equivalent but also the conventional term used in Russian scientific and engineering literature. Newmark's distinction between semantic and communicative translation helps explain why such a solution is appropriate here. Semantic translation stays very close to the source formulation and aims to retain the original precision and informational density, which is particularly important for scientific texts. Communicative translation, by contrast, allows for greater adaptation to the reader but may sacrifice some technical accuracy or specificity.

For terminology of this kind, any attempt to simplify or paraphrase would likely make the expression less exact and potentially introduce ambiguity. Scientific readers expect to see standardized terminology rather than modified or stylistically adjusted variants. This is why Newmark notes that semantic translation is generally the preferred method for technical and scientific material, as it conveys the author's intended meaning as directly as possible (Newmark, 1988: 47–49).

However, a notable shift occurs in the symbolic representation of "area". While the English version uses the symbol "A", the Russian translation uses "S", which reflects symbolic modulation – A technique described by Vinay and Darbelnet where the translator changes the usual form without altering the meaning. In Russian scientific and engineering texts, "S" is commonly used to denote area "площадь", and this substitution reflects the target language's disciplinary norms. This illustrates how technical translation involves not only lexical equivalence but also adaptation to the symbolic and notational conventions of the target audience.

The Kazakh translation maintains semantic integrity. The term "электр тоғы" is the established Kazakh equivalent for "electric current", the phrase "бір уақыт бірлігі ішінде" effectively mirrors "per unit time", while "көлденең қиманың белгілі бір ауданы" conveys the meaning of "some cross-sectional area" with precision. What distinguishes the Kazakh translation is its combination of literal translation and modulation. While the conceptual content remains intact, the syntactic arrangement shifts to suit the natural flow of Kazakh. For instance, the Russian "площадь поперечного сечения" is adapted to "көлденең қиманың ауданы", reflecting Kazakh grammatical structure. Although the symbol "S" is not explicitly included, the concept it represents is conveyed through descriptive terminology. This reflects the tendency in Kazakh scientific texts to emphasize clarity of meaning over symbolic brevity, unless symbols are required by context.

Thus, in Russian translation we can observe literal translation with symbolic modulation and in Kazakh translation – blend of literal translation and semantic modulation, with cultural and syntactic adaptation reflecting the Kazakh linguistic system. Both translations demonstrate a strong commitment to technical accuracy while adapting to the respective scientific traditions of the target languages.

Original: Within conductors such as copper, electrical current is made up of free electrons moving through a lattice of copper ions (Scherz, 2016: 7).

Translation by S. Taranushenko: В проводниках, например, в меди, электрический ток состоит из свободных электронов, перемещающихся в решётке атомов меди (Scherz, Taranushenko, 2018: 25).

Translation by the authors: Мыс сияқты өткізгіштерде электр тоғы мыс иондарының торы арқылы қозғалатын еркін электрондардан тұрады.

The term “conductors such as copper” is translated as “в проводниках, например, в меди”, which accurately conveys the meaning and preserves the example from the original. “Free electrons” is rendered as “свободные электроны”, maintaining precise technical terminology in line with standard Russian physics discourse. The phrase “lattice of copper ions” is translated as “решётка атомов меди”, applying modulation to produce a natural Russian expression; however, the shift from “ions” to “atoms” slightly reduces scientific accuracy. Overall, the Russian translation largely reflects a semantic approach, with literal translation for technical terms and occasional modulation and transposition for fluency. Passive constructions are sometimes retained and sometimes replaced by active forms to improve readability, and explanatory phrases are added for clarification. While the translation reads naturally, minor conceptual deviations may affect strict scientific precision.

In Kazakh version the term “conductors such as copper” is translated as “мыс сияқты өткізгіштер”, which accurately conveys the meaning and preserves the example provided in the original sentence. “Free electrons” is rendered as “еркін электрондар”, maintaining the technical precision of the term. “Lattice of copper ions” is translated as “мыс иондарының торы”, which is more accurate than the Russian version that used “atoms” instead of “ions”. The Kazakh version correctly maintains the reference to ions, which is essential in the context of solid-state physics.

Original: To get electrical current to flow from one point to another, a voltage must exist between the two points (Scherz, 2016: 9)

Translation by S. Taranushenko: Чтобы заставить электрический ток протекать от одной точки к другой, между этими точками должно быть напряжение (Scherz, Taranushenko, 2018: 28).

Translation by the authors: Электр тоғының бір нүктеден екінші нүктеге өтуі үшін осы екі нүктенің арасында кернеу болуы керек.

The Russian version closely mirrors the structure and logic of the original sentence. The verb “заставить… протекать” (to force… to flow) emphasizes the active requirement for current to flow, which corresponds well to “to get... to flow”. The phrase “между этими точками должно быть напряжение” accurately conveys “a voltage must exist between the two points”.

The Kazakh translation uses a more natural and concise syntactic structure suited to Kazakh grammar. The expression “электр тоғының өтуі үшін” corresponds to “to get current to flow” without introducing an artificial causative construction like “to force”; “кернеу болуы керек” accurately conveys the modal necessity from the original “must exist”.

Both Russian and Kazakh translations maintain semantic fidelity, preserving the cause-effect relationship: voltage is required – current flow.

The Kazakh translation demonstrates modulation, adjusting syntactic structure for naturalness. Instead of a direct causative (“to get… to flow”), it shifts to a goal-oriented clause (for current to flow... voltage must be present). The scientific term “кернеу” (voltage) is correctly used in Kazakh and reflects standard usage in technical contexts.

In these translation examples the following strategies were used: 1) Literal translation: Terminology – “Electrical current” – “электрический ток”; “voltage” – “напряжение” – both terms are accurate and standard equivalents. 2) Syntactic adaptation: The infinitive construction “to get... to flow” is rendered into a subordinate clause with an infinitive in Russian (чтобы заставить...), which maintains the causal relation.

Original: A voltage placed across a conductor gives rise to an electromotive force (EMF) that is responsible for giving all free electrons within the conductor a push (Scherz, 2016: 9).

Translation by S. Taranushenko: Прилагаемое к концам проводника напряжение создает электродвижущую силу (ЭДС), которая приводит в движение все свободные электроны в проводнике (Scherz, Taranushenko, 2018: 28).

Translation by the authors: Өткізгіштің екі ұшына түсірілген кернеу оның ішіндегі барлық еркін электрондарды қозғалысқа келтіретін электрқозғаушы күшті (ЭҚК) тудырады.

The Russian version is a functional and natural scientific translation, adhering to established conventions in technical texts. Key terms such as: “напряжение” (voltage), “проводник” (conductor), “электродвижущая сила (ЭДС)” (electromotive force (EMF)), “приводит в движение” (causes to move / sets into motion) are all standard and appropriate within the scientific context. The phrase “прилагаемое к концам проводника напряжение” precisely mirrors “a voltage placed across a conductor”, showing correspondence to the original structure. The translator chooses to render “gives all free electrons a push” as “приводит в движение все свободные электроны”, which is a more formal and technical equivalent, avoiding the metaphor “push” and replacing it with a precise

physical action – “set in motion”. This is an example of modulation, adjusting figurative language for terminological clarity.

The Kazakh translation mirrors the Russian structure but adapts it to Kazakh grammar and stylistic norms. For example: “кернеу” (voltage), “өткізгіш” (conductor), “электрқозғаушы күш (ЭҚК)” (electromotive force (EMF)), “қозғалысқа келтіретін” (causing motion / initiating movement). The phrase “өткізгіштің екі ұшына түсірілген кернеу” clearly and naturally conveys “a voltage placed across a conductor” and is equivalent to the Russian “прилагаемое к концам проводника напряжение”. The verb phrase “қозғалысқа келтіретін” captures the intent behind “giving all free electrons a push”, avoiding the informal or metaphorical tone of “push” and replacing it with a more academic and precise expression. This again reflects the translator’s use of modulation and explicitation to match the target audience’s expectations in Kazakh scientific discourse. The overall structure and terminology are consistent with scientific standards, and abbreviations like (ЭҚК) are retained similarly to Russian and English conventions.

Original: This voltage then drives all free electrons, everywhere within the circuit, in a direction that points from negative to positive (Scherz, 2016: 9).

Translation by S. Taranushenko: Создаваемая этим напряжением ЭДС приводит в движение все свободные электроны по всей цепи в направлении от отрицательного потенциала батарейки к положительному (Scherz, Taranushenko, 2018: 28).

Translation done by the authors: Кернеу тізбектегі еркін электрондарды терістен оңға қарай қозғайды.

In this example Taranushenko used the method of modulation to make the sentence sound more natural and accurate in Russian. Moreover, the translator used the method of lexical shift. The verb “drives” (двигает) is translated as “приводит в движение”. It sounds more technical and appropriate. The phrase “отрицательного потенциала батарейки” is added to clarify the meaning. The translator uses modulation as the main strategy and adds information where it is needed.

The Kazakh translation uses a semantic approach to convey the overall meaning of the original sentence in a clear and natural way. It prioritizes fluency and readability, sometimes leaving out redundant or specific details that might disrupt understanding. The phrase “This voltage” is translated as “бұл кернеу” and it is both literal and accurate. The term “voltage” is correctly translated as “кернеу”. The technical meaning is preserved completely. The verb “drives” is translated as “қозғайды”, which conveys the idea of initiating motion clearly and appropriately. This corresponds well to the Russan version “приводит в движение”. However, the Kazakh translation is more concise and keeps a scientific tone. The “all free electrons” is translated as “барлық еркін электрондарды”, which is a direct and accurate translation that preserves the original meaning. The phrase “everywhere within the circuit” is translated more compactly as “тізбектегі”. Although this version shortens the original text, it still conveys the idea of full coverage within the circuit. The Russian “по всей цепи” is slightly explicit but convey the same concept. The final part “in a direction that points from negative to positive” is translated into Kazakh as “терістен оңға қарай”. This is a functional equivalent, which expresses the direction of electron flow clearly and concisely. The Russian translation expands into “от отрицательного потенциала батарейки к положительному”, providing more technical detail. The Kazakh version opts for clarity and simplicity. In terms of register and style, the Kazakh translation maintains a neutral scientific tone appropriate for technical context. Some elements such as “the potential of the battery” are omitted. These omissions are strategic. They reduce redundancy and make the sentence more accessible without sacrificing essential meaning.

Original: As free electrons within the lamp filament experience an EMF due to the applied voltage, the extra energy they gain is transferred to the filament lattice atoms (Scherz, 2016: 10).

Translation by S. Taranushenko: Под влиянием ЭДС, создаваемой прилагаемым напряжением, на свободные электроны нити накаливания лампочки последние получают дополнительную энергию, которая передается на атомы материала решетки нити накаливания (Scherz, Taranushenko, 2018: 28).

Translation by the authors: Қолданылған кернеудің әсерінен пайда болған ЭДС нәтижесінде қыздыру сымындағы еркін электрондар қосымша энергия алып, бұл энергия сымның тор құрылымындағы атомдарға беріледі.

The Russian translation effectively conveys the intended scientific process. The phrase “под влиянием ЭДС, создаваемой прилагаемым напряжением” offers a clear and formal translation of the English phrase “experience an EMF due to the applied voltage”. It captures the cause-and-ef-

fect relationship accurately and maintains the logical structure of the original sentence. A few stylistic aspects should be noted. The use of "последние" is grammatically correct, yet stylistically heavy. This type of translation is typical for Russian scientific discourse. In addition, the repetition of the phrase "нити накаливания" at the end of the sentence feels redundant.

A more elegant solution would involve rephrasing or using a pronoun to avoid tautology. The expression "атомы материала решетки нити накаливания" is technically precise but also verbose, which can reduce the overall fluency of the sentence.

The Kazakh translation of the sentence is technically accurate rendering that closely aligns with the conventions of scientific and academic writing. The opening clause, "Қолданылған кернеудің әсерінен пайда болған ЭДС нәтижесінде", is a precise and well-structured equivalent of the English segment "as free electrons... experience an EMF due to the applied voltage." The word "қолданылған" accurately corresponds to "applied", while "кернеудің әсерінен пайда болған ЭДС" clearly conveys the causal relationship embedded in the original sentence. Although the use of "нәтижесінде" slightly changes the syntax of the original it remains grammatically correct and stylistically appropriate for scientific writing. The phrase "қыздыру сымындағы еркін электрондар қосымша энергия алып" accurately conveys the idea that the free electron gains extra energy. The phrase "қыздыру сымындағы еркін электрондар" is a clear and precise equivalent of "free electrons within the lamp filament". The phrase "бұл энергия сымның тор құрылымындағы атомдарға беріледі" expresses the transfer of this energy to the lattice atoms. The phrase "тор құрылымындағы" offers a more explicit and technical equivalent than a simpler variant such as "торындағы", enhancing clarity for a specialized audience. The passive construction "беріледі" mirrors the original's structure and fits well within the conventions of academic Kazakh, especially in scientific writing where passive voice is frequently used to maintain an objective tone.

The comparative analysis of English, Russian, and Kazakh technical translations shows clear patterns in how scientific meaning is preserved, adapted, or slightly changed across languages. It becomes clear that the methods of conveying content depend not only on terminological accuracy, but also on the characteristics of scientific text construction in each language. Literal translation is most common for technical terms and definitions in the Russian language because it ensures consistency in scientific discourse. The Kazakh translation, on the contrary, freely reworks the phrase, using modulation and semantic adaptation and thus achieving a rhythm that is natural for the Kazakh language. As a result, the same elements of the source text are transmitted in different ways. These differences are clearly illustrated in two diagrams. Figure 1 presents the distribution of translation strategies in Russian technical texts, where literal translation makes up 50%, modulation and transposition 20%, while semantic adaptation are less frequent at 10% (Figure 1).

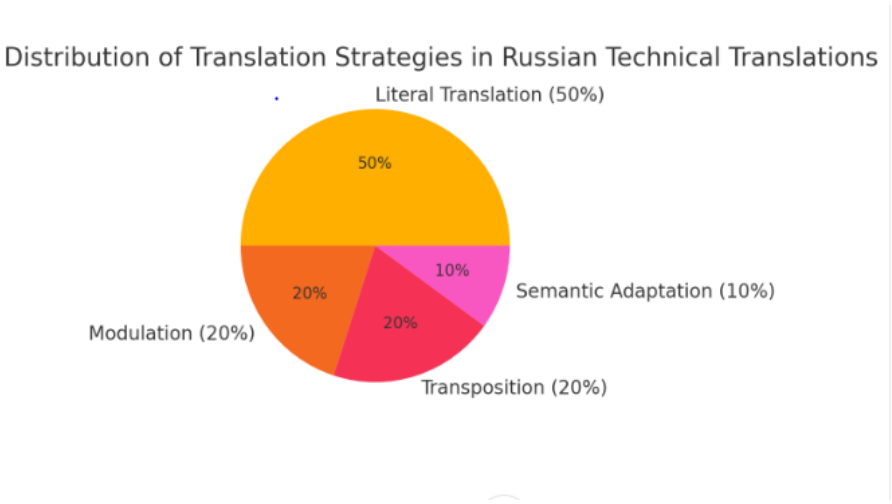

Figure 1 – Distribution of translation methods in Russian technical translations

Figure 2 presents the distribution of translation strategies in Kazakh technical texts, where literal translation makes up only 30% and modulation with semantic adaptation plays a more prominent role. Transposition is present in the Kazakh examples, but to a much lesser extent of 10%. That can be explained by differences in syntax and the norms of Kazakh scientific style.

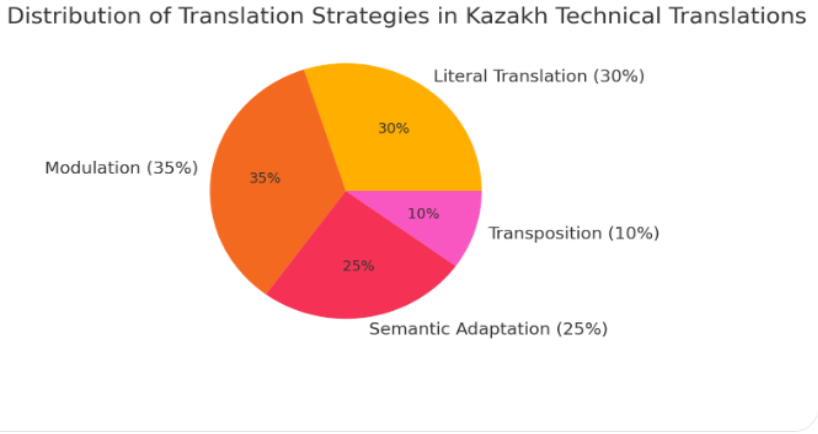

Figure 2 – Distribution of translation methods in Kazakh technical translations

The results of the comparative analysis reveal that technical translation between English, Russian, and Kazakh involves complex decisions influenced by linguistic structure, scientific convention, and the expectations of the target audience. Several linguistic features, particularly nominalizations, passive constructions, technical terms, and symbolic notation proved especially challenging. In particular, the presence of complex noun phrases and technical terms often required transposition and modulation to keep the translation clear and grammatically correct.

The effectiveness of specific strategies was closely tied to the structural and stylistic norms of each language. For instance, the literal strategy was effective when translating standardized terminology but resulted in awkward phrasing when used for more idiomatic expressions or when dealing with English scientific metaphors (e.g., “drives the electrons”). In these cases, the semantic translation approach common in the Kazakh renderings proved more successful in preserving the intended meaning while maintaining fluency and readability. Similarly, Russian translations often added clarifying phrases or altered word order to better conform to academic Russian discourse norms, even at the expense of stylistic brevity.

Our findings partially confirm earlier observations made by Newmark and Vinay and Darbelnet, who emphasized the role of literal and semantic strategies in technical translation. However, unlike previous works, our study reveals how these strategies manifest differently in Russian and Kazakh due to structural and cultural differences between the two languages. This three-language comparative perspective has rarely been seen in earlier works. For this reason, our research can be considered novel.

The present study contributes to the methodology of technical translation since it provides rare side-by-side comparisons across all three languages, demonstrating how translation decisions are strongly determined by linguistic and cultural systems. The novelty of this work lies in a systematic comparison of English, Russian, and Kazakh technical translations, which has never been fully addressed in translation studies before.

The study has a number of practical implications that follow from these findings. For professional translators, it identifies flexibility in selecting translation strategies appropriate for any text variety: in other words, literal translation is not always the best choice. Secondly, training programs need to focus on providing context-dependent strategies for translating along with increased scientific discourse exposure both in the target and source languages.

For educators, the integration of comparative translation tasks and constructive linguistic analysis into the curriculum can promote student appreciation of the subtle problems lying at the heart of

technical translation. In translator training, more attention needs to be paid to the pragmatic functions of language in scientific texts, rather than just terminological accuracy. Workshops or modules on constructive analysis based on examples such as those discussed here could greatly enhance translator competence.

Conclusion

The present study has explored the linguistic features of technical texts and the translation challenges they pose. The general objective of this research has been to identify some important linguistic features of technical discourse and to investigate effective strategies for their translation. Descriptive and comparative methods were used, with the analysis of both source and target texts.

The key findings revealed that technical language is often characterized by dense terminology, passive voice construction, and a high number of specialized abbreviations. If not handled carefully, it may make both understanding and translation more difficult.

It also emerged from the analysis that literal translation is sometimes insufficient to bring out a clear and accurate meaning in the receptor language. On the contrary, many times it requires a combination of strategies like transposition, modulation, and adaptation in order to achieve an effective translation.

This paper contributes to translation research by underlining the fine-grained decision-making that enters translation of technical texts. The novelty of this paper lies in the combination of an analysis of linguistic features with an examination of translation strategies.

Overall, the findings confirm that strategic translation is imperative within technical domains, where precision and clarity are at stake. Translators should possess not just high level of linguistic competence but also a good understanding of the functional features of technical discourse.

Furthermore, the comparative analysis demonstrated clear differences between Russian and Kazakh approaches to technical translation, in particular in the use of literal strategies in Russian and semantic adaptation in Kazakh. These differences highlight the importance of choosing strategies that reflect both linguistic structure and disciplinary conventions. The results also show that maintaining terminological consistency while adjusting syntactic structures is important for maintaining scientific accuracy across languages. By identifying these trends, the study provides practical insights that can help translators anticipate common problem areas in technical texts. Further research could create specialized training programs and investigate interdisciplinary approaches to further develop standards regarding technical translations among various languages. In the future, the dataset could also be expanded to include additional scientific fields, or empirical testing could be conducted with professional translators to help clarify the applicability of the proposed observations.

References

Delisle, J., & Cloutier, P. (1995). The invention of alphabets. In J. Delisle & J. Woodsworth (Eds.), Translators Through History (P. 7–21). Amsterdam. John Benjamins.

Byrne, J. (2012). Scientific and Technical Translation Explained: A Nuts-and-Bolts Guide for Beginners. New York: Routledge.

Byrne, J. (2006). Technical Translation: Usability Strategies for Translating Technical Documentation. Netherlands: Springer.

Montalt, V., & González, D. M. (2014). Medical Translation Step by Step: Learning by Drafting. New York. Routledge. https://doi.org/10.4324/9781315760377

Krein-Kuehle, M. (2003). Equivalence in Scientific and Technical Translation: A Text-Based Study. Manchester. St. Jerome Publishing.

Гарбовский, Н. К. (2007). Теория перевода. Москва. Издательство Московского университета.

Kingscott, G. (2002). Technical translation and related disciplines. Perspectives. Studies in Translatology, Vol. 10(4), P. 247–255.

Vinay, J., Darbelnet, J. (1995). Comparative Stylistics of French and English: A Methodology for Translation (J. C. Sager & M.-J. Hamel, Trans. & Eds.). Amsterdam/Philadelphia. John Benjamins.

Newmark, P. (1988). A Textbook of Translation. New York. Prentice Hall.

Tavares, C., Tallone, L., Oliveira, L., & Ribeiro, S. (2023). The challenges of teaching and assessing technical translation in an era of neural machine translation. Education Sciences, Vol. 13(6), P. 541. https://doi.org/10.3390/educsci13060541

Pym, A. (2018). Exploring Translation Theories (2nd ed.). London. Routledge.

Федоров, А. В. (2002). Основы общей теории перевода: Лингвистические проблемы (5-е изд.). Санкт-Петербург: Филологический факультет СпбГУ. Москва. Филология ТРИ.

Комиссаров, В. Н. (2000). Общая теория перевода. Москва. ЧеРо.

Тарақ, Ә. (2008). Ғылыми көпшілік және ғылыми-техникалық аударма. Алматы. Тіл оқу-әдістемелік орталығы.

Құрманбайұлы, Ш. (2005). Терминқор қалыптастыру көздері мен терминжасам тәсілдері: Барлық сала мамандарына арналған әдістемелік құрал. Алматы. Сөздік–Словарь.

Қайдаров, Ә. (1993). Қазақ терминологиясына жаңаша көзқарас. Алматы. Рауан.

Кузар, Ж. Н., & Күлдеева, Г. И. (2023). Ғылыми мәтіндегі терминдер аударма нысаны ретінде. Bulletin of the Karaganda University. Philology Series, Vol. 2(110), P. 40–47. https://doi.org/10.31489/2023Ph2/40-47

Scherz, P., Monk, S. (2016). Practical Electronics for Inventors (4th ed.). New York. McGraw-Hill Education.

Шерц, П., Монк, С. (2018). Электроника. Теория и практика (С. Таранушенко, пер.). Санкт-Петербург. Питер.

References

Byrne, J. (2006). Technical Translation: Usability Strategies for Translating Technical Documentation. Netherlands. Springer.

Byrne, J. (2012). Scientific and Technical Translation Explained: A Nuts-and-Bolts Guide for Beginners. NY. Routledge.

Deslisle, J., Cloutier, P. (1995). The Invention of Alphabets, in Delisle, Jean and Judith Woodsworth (eds) Translators Through History. Amsterdam: John Benjamins. P. 7-21.

Fedorov, A.V. (2002). Osnovy obshchei teorii perevoda: Lingvisticheskie problemy [Fundamentals of general theory of translation: Linguistic problems] (5th ed.). St. Petersburg: Philological Faculty of SPbSU; Moscow. Philologiya TRI (In Russian).

Garbovskii, N.K. (2007). Teoriya perevoda [Translation theory]. Moscow. Moscow State University Press (In Russian).

Kingscott, G. (2002). Technical Translation and Related Disciplines, in Perspectives: Studies in Translatology. Vol. 10(4). P. 247-255.

Komissarov, V.N. (2000). Obshchaya teoriya perevoda [General theory of translation]. Moscow. CheRo (In Russian).

Krein-Kuehle, M. (2003). Equivalence in scientific and technical translation: A text-based study. Manchester. St. Jerome Publishing.

Montalt, V., González, D.M. (2014). Medical Translation Step by Step: Learning by Drafting. NY. Routledge. https://doi.org/10.4324/9781315760377

Newmark, P. (1988). A textbook of translation. New York. Prentice Hall.

Pym, A. (2018). Exploring translation theories (2nd ed.). London. Routledge.

Scherz, P. and Monk, S. (2016). Practical electronics for inventors (4th ed.). New York. McGraw-Hill Education.

Scherts, P., Monk, S. (2018). Elektronika. Teoriya i praktika [Electronics: Theory and practice] (S. Taranushenko, Trans.). St. Petersburg. Piter (In Russian).

Tavares, C., Tallone, L., Oliveira, L., Ribeiro S. (2023). The challenges of teaching and assessing technical translation in an era of neural machine translation. Education Sciences, Vol. 13(6), P. 541. https://doi.org/10.3390/educsci13060541

Vinay, J., Darbelnet, J. (1995). Comparative stylistics of French and English: A methodology for translation (J. C. Sager & M.-J. Hamel, Trans. & Eds.). Amsterdam/Philadelphia. John Benjamins.

Tarak, A (2008). Gylymi kopshilik jane gylymi-tehnikalyk audarma [Popular scientific and scientific-technical translation]. Almaty. Til oku-adistemelik ortalygy (In Kazakh).

Qurmanbaiuly, Sh. (2005). Terminqor qalyptastyru kozderi men terminzhasam tasilderi. Barlyq sala mamandaryna arnalğan adistemelik qural [Sources of terminology and ways of terminology formation]. Almaty. Sozdik-Slovar [in Kazakh].

Qaydarov, A. (1993). Qazaq terminologiiasina zhanasha kozqaras [A new approach to Kazakh terminology]. Almaty. Rauan [in Kazakh].

Kuzar, Zh.N., Kuldeeva, G.I. (2023). Gylymi matindegi terminder audarma nysany retinde [Terms in scientific texts as an object of translation]. Bulletin of the Karaganda University. Philology series. Vol. 2(110), 40–47. Almaty. https://doi.org/10.31489/2023Ph2/40-47 (in Kazakh).

Information about authors

Zhussupova Akbota (corresponding author) – PhD, Senior Lecturer, Department of Foreign Languages, Abai Kazakh National Pedagogical University (Kazakhstan, Almaty, e-mail: zhussupova.akb@gmail.com);

Kazybek Gulmira – Candidate of Philological Sciences, Associate Professor, Department of Philology and Translation Studies, al-Farabi Kazakh National University (Kazakhstan, Almaty, e-mail: Kazybek_68@mail.ru).

Авторлар туралы мәлімет

Жүсіпова Ақбота Өтепбергенқызы (корреспондент-автор) – PhD, аға оқытушы, Абай атындағы Қазақ ұлттық педагогикалық университеті, Шетел тілдері кафедрасы (Қазақстан, Алматы, e-mail: zhussupova.akb@gmail.com);

Қазыбек Гүлмира Құдайбергенқызы – филология ғылымдарының кандидаты, филология және аударма ісі кафедрасының доценті, әл-Фараби атындағы Қазақ ұлттық университеті (Қазақстан, Алматы, e-mail: Kazybek_68@mail.ru).

Сведения об авторах:

Жусупова Акбота Утепбергеновна (корреспондентный автор) – доктор PhD, старший преподаватель кафедры иностранных языков Казахского национального педагогического университета имени Абая (Алматы, Казахстан, e-mail: zhussupova.akb@gmail.com).

Казыбек Гульмира Кудайбергенкызы – кандидат филологических наук, доцент кафедры филологии и переводческого дела Казахского национального университета имени аль-Фараби (Алматы, Казахстан, e-mail: Kazybek_68@mail.ru).

Date of receipt of the article: October 22, 2025.
Accepted: December 10, 2025.