

TRANSLATION TECHNIQUES IN TECHNICAL AND SCIENTIFIC TEXTS

Nurimbetova Malika Karamatdin qizi,
a student of the Faculty of Foreign languages



Abstract: *Translation of technical and scientific texts requires specialized techniques to ensure precision, clarity, and terminological consistency. Unlike literary translation, technical translation demands strict adherence to terminology, logical structure, and objective tone to convey accurate information. This article examines core translation techniques such as literal translation, transposition, modulation, equivalence, and calque, highlighting their applications and challenges in scientific and technical domains. Examples from various languages illustrate these techniques in practice. The article also discusses tools and resources that support translators in maintaining quality and consistency. The conclusion emphasizes the importance of these techniques in facilitating global scientific communication and advancing knowledge transfer.*

Keywords: *Technical translation, scientific translation, terminology, literal translation, transposition, modulation, equivalence, calque, translation techniques, specialized texts*

Technical and scientific translation plays a crucial role in the dissemination of knowledge across language barriers, impacting fields ranging from medicine to engineering. Unlike literary texts that prioritize style and creativity, technical and scientific texts demand clarity, precision, and terminological accuracy to avoid misunderstandings that could lead to serious consequences. This genre includes research articles, manuals, patents, technical reports, and scientific papers, all of which contain specialized vocabulary, formulae, and data that must be carefully preserved in translation.

The complexity of technical translation arises not only from the specialized terminology but also from the distinct textual features such as passive voice constructions, complex syntactic structures, and a highly objective tone. Additionally, translators must consider the target audience, who are often experts requiring precise and standardized information rather than general or simplified explanations. [1] To meet these challenges, translators employ various techniques that go beyond literal word-for-word translation. These include methods like transposition, modulation, equivalence, and calque. Each technique serves to adapt the source text into the target language while preserving its original meaning, scientific accuracy, and readability. In some cases, translators must negotiate between adhering to source language structures and producing a text that reads naturally in the target language.

This article explores these translation techniques in detail, demonstrating their use with examples and explaining how they address common difficulties in technical and scientific translation. By understanding and applying these techniques, translators can ensure that vital scientific knowledge is accurately communicated across languages, fostering international collaboration and innovation.

One of the fundamental challenges in technical translation is maintaining consistent use of terminology. Incorrect or inconsistent terms can lead to confusion or errors in understanding technical instructions or scientific findings. To ensure consistency, translators rely heavily on glossaries, termbases, and databases such as IATE or domain-specific glossaries. For example, the English term “*catalyst*” must always be translated consistently as “*catalyseur*” in French within a chemical text to avoid ambiguity.

Literal translation is often suitable in scientific texts where concepts and terms have clear equivalents. This technique involves translating word-for-word when possible, preserving the structure and terminology of the original. For example:

- EN: “The enzyme accelerates the reaction.”

- ES: “La enzima acelera la reacción.”

However, literal translation is not always feasible due to structural differences between languages.

Transposition involves changing the grammatical form without changing meaning. It is often used to make sentences sound more natural in the target language. For example:

- EN: “The description of the experiment was detailed.”
- DE: “Die Beschreibung des Experiments war detailliert.” (Noun to noun, literal)
- FR: “L’expérience a été décrite en détail.” (Noun to verb + adverb)

Here, French uses a verb phrase instead of a noun phrase to sound more natural.

Modulation changes the viewpoint or expression while maintaining the message. It’s common when a direct translation would sound awkward or unnatural. For example:

- EN: “The system operates under low pressure.”
- FR: “Le système fonctionne à basse pression.”

The phrase “under low pressure” is modulated into “à basse pression” (at low pressure) to fit French linguistic norms.

Translation of technical and scientific texts is a specialized discipline requiring a careful balance between linguistic accuracy and domain knowledge. The use of translation techniques such as literal translation, transposition, modulation, equivalence, and calque enables translators to produce texts that are not only faithful to the original but also clear and accessible to the target audience. Each technique addresses specific linguistic challenges inherent in scientific communication. For example, literal translation ensures precise term transfer, while transposition and modulation improve naturalness and readability. Equivalence secures recognition of established concepts across languages, and calque supports the introduction of new terminology.

Moreover, technological tools such as CAT software, terminology databases, and translation memories support translators by enhancing consistency and efficiency. Despite advances in machine translation, the complexity of scientific texts means that expert human translators remain indispensable, especially for ensuring that nuances and contextual meanings are preserved. Ultimately, effective translation in the scientific and technical domains fosters international collaboration, supports research dissemination, and contributes to global progress. As scientific knowledge continues to expand rapidly, translators must continue refining their skills and techniques to meet the evolving demands of this critical field.

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