THE ROLE OF TECHNICAL ENGLISH IN THE DEVELOPMENT AND APPLICATION OF MODERN TECHNOLOGIES

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https://doi.org/10.5281/zenodo.24310917

ABSTRACT: The rapid development of modern analytical technologies and digital systems has significantly transformed the activities of analytical laboratories in the mining and metallurgical industry. In this context, proficiency in Technical English has become an important supporting competence for specialists working with advanced analytical equipment and international technical documentation. This study examines the role of English technical terminology and professional communication in the application of modern analytical technologies, particularly atomic absorption spectrometry (AAS) and optical emission spectrometry (OES).

Keywords: Technical English, English for Specific Purposes, analytical laboratory, atomic absorption spectrometry, optical emission spectrometry, chemical analysis, calibration, measurement accuracy, quality control, mining and metallurgy.

The development of modern technologies and automation has brought significant changes to the mining and metallurgical industry. Today, advanced analytical instruments and automated systems are widely used in industrial laboratories to determine the chemical composition of ores, concentrates, metals, and other industrial materials.

Technical English as a Tool for Understanding Analytical Equipment

Modern analytical instruments, including atomic absorption spectrometers (AAS) and optical emission spectrometers (OES), are accompanied by technical manuals, operating instructions, software interfaces, and maintenance documentation.

Understanding terminology such as *hollow cathode lamp, nebulizer, burner alignment, wavelength, absorbance,* and *background correction* enables laboratory specialists to interpret technical information related to instrument operation.

For example, the correct interpretation of calibration instructions and instrument-related software messages is important when performing analytical procedures and maintaining equipment in accordance with manufacturers' recommendations.

The analytical capabilities of AAS and OES instruments depend on their technical configuration, analytical method, and the elements selected for determination. Therefore, understanding the relevant technical documentation is essential for selecting and applying appropriate analytical procedures.

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Consequently, Technical English serves as an important professional resource for accessing manufacturers' recommendations and understanding the operating principles of analytical equipment.

The Importance of Technical Terminology in Analytical Procedures

The development of analytical technologies has contributed to the expansion of specialized terminology used in laboratory activities.

Based on the terminology examined in analytical chemistry and instrumental analysis, the following thematic classification is proposed.

Table 1. Classification of Technical English Terminology Used in Analytical Laboratories

Terminological category	Technical terms	Professional application
Analytical methods	AAS, OES, absorbance, wavelength	Instrumental analysis
Instrument components	Nebulizer, hollow cathode lamp, burner	Equipment operation
Chemical analysis	Sample preparation, analyte, concentration	Chemical determination
Calibration and quality control	Calibration curve, standard solution, RSD, repeatability	Analytical quality assurance
Data processing	Signal intensity, detection limit, analytical report	Data interpretation

Source: Compiled by the author based on analytical chemistry terminology and the reviewed cientific literature.

The classification demonstrates that technical terminology is not limited to individual equipment components. It also includes concepts related to analytical measurements, data interpretation, quality assurance, and professional documentation.

Understanding these terms is important for interpreting analytical procedures, technical recommendations, and measurement-related documentation.

Technical English and Laboratory Quality Management

Quality assurance is one of the fundamental requirements of modern analytical laboratories.

The ISO/IEC 17025:2017 standard establishes requirements concerning personnel competence, equipment, technical procedures, and the validity of laboratory results.

In particular, Clause 6.2 addresses personnel competence, qualifications, training, and experience. Although the standard does not establish English proficiency as a separate mandatory requirement, knowledge of Technical English can facilitate access to international technical documentation and manufacturers' recommendations.

In analytical laboratories, the correct understanding of terms such as *calibration, accuracy, precision, repeatability, reproducibility,* and *relative standard deviation (RSD)* is important for interpreting measurement results and quality control procedures.

Furthermore, English-language scientific publications provide access to internationally recognized approaches to analytical measurements and laboratory quality management.

Thus, Technical English can be considered a supporting factor in the professional development of laboratory personnel and the effective application of quality management practices.

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Table 2. Proposed Components for Developing Technical English Competence

Component	Main learning content	Expected professional outcome
Technical vocabulary	AAS, OES, calibration, chemical analysis	Understanding specialized terminology
Documentation comprehension	Equipment manuals, instructions, standards	Better interpretation of technical information
Professional communication	Scientific publications, technical reports, terminology exchange	Improved access to international professional information

Source: Developed by the author.

Overall, the analysis suggests that Technical English should be regarded not merely as a foreign language skill but also as an important supporting competence for working with modern analytical technologies and accessing international scientific and technical information.

The development of modern technologies has significantly transformed the activities of analytical laboratories in the mining and metallurgical industry. At the same time, it has increased the importance of technical knowledge and professional communication.

In conclusion, the integration of Technical English into the professional development of analytical laboratory personnel can contribute to improving their professional competence and supporting the effective application of modern analytical technologies.

In the rapidly developing era of artificial intelligence, science, and advanced technologies, the ability to understand and communicate in English represents an important opportunity for specialists seeking professional growth and participation in international scientific and technological developments.

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