

Some basic challenges and strategies in teaching translation to Chemistry majors

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Efficient teaching of English for Specific Purposes (ESP) requires substantial effort which includes fostering the skills of scientific texts translation. The study deals with the methodology of teaching translation to MA and post-graduate students specialising in Chemistry and possessing little or no knowledge of translation techniques, reviews discussions on translation theory and practice to illustrate their evolution and attempts to make a contribution to this discussion by offering some new perspectives of interest in the field. The study lists translation strategies to be applied with non-language majors and tests them out with MA and post-graduate students in the Chemistry Department of Moscow Technical University with experiment and control groups further evaluating students' progress via quantitative and qualitative methods of analysis.

KEYWORDS: translation, translation technique, non-linguistic faculties, competence in translation



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1. INTRODUCTION

Over the last decades, many researchers have spoken in support of the idea that teaching translation to university students should incorporate both theoretical and practical components, taking this idea forward in numerous studies and textbooks intended for students majoring in linguistic disciplines (see, for example, Komissarov, 1997; Latishev & Semenov, 2003; Cook, 2010; Gambier, 2012). For one thing, lack of theoretical background was proved to somewhat devalue the practical skill, while beyond that, adequate translation proficiency at some point ceased to be perceived as an off-the-

wall competency or even art (Chukovsky, 1984), but came to be referred to as an altogether affordable skill to be mastered (Calvo, 2011).

While studies in translation have in many ways taken a quantum leap, translation as a discipline is still considered a priority of language majors, with non-majors enrolled in non-linguistic faculties and universities still lacking adequate translation training, for with them it only comes down to checking basic reading skills at best.

This poses an issue that needs to be addressed for a number of reasons. Most crucially, the

overwhelming expansion of international relations inevitably generates voluminous written communication, with research publications as one of its major constituents, and ongoing global networking more than ever before involves ensuring expedient translation services. As the 21st century has been dubbed 'the era of translation and translators', fostering the corresponding skills has become one of the priorities in higher professional education.

Both undergraduate and postgraduate university students are required to read and translate a fair amount of scientific papers in order to pursue their own research objectives, meaning that they also need to develop a range of skills underlying their ultimate translation competency, the latter including a number of sub-competences representing a range of skills to be developed in both their mother tongue and the foreign language.

Notably, ESP students invariably face a number of problems having to do with translating procedures. To address these, the teacher will have to be on the lookout for potential difficulties and be able to apply appropriate coping techniques. First and foremost, it is crucial to consider and analyse specific translation practices, define the skills that are of primary importance for ESP students, and make a practical distinction between bilingual and essential skills (Larson, 1984). Importantly, major

roadblocks can be associated with a cross-language mismatch giving rise to issues such as lexical interference, which remains relatively unexplored in terms of the methodological aspects involved (Malyuga et al., 2017).

This study explores how scientific post-graduates, Chemistry students in particular, can successfully manage foreign language texts and reviews the most recent perspectives in the field of translation.

2. MATERIALS AND METHODS

This paper assesses the ability of Chemistry students on MA and other post-graduate courses at Moscow Technical University who are non-language majors and evaluates their progress in using quantitative and qualitative methods of analysis in translation. Quantitative evaluation was premised on a questionnaire completed by the students while delivering on their term task, and the qualitative method relied on scientific article analyses and students' short reports, which were due one week before the final test. The resulting data were summarised and analysed per group, revealing the key problems encountered in translation as well as the percentage ratio of common mistakes made in translation.

3. THEORETICAL BACKGROUND

Intensive research on translation got underway in the late 20th century with the studies by scholars such as Holmes (1988), Catford (1978), and Nida

(1998), the latter being one of the first scholars to define the concept of translation in a more systematic manner, claiming that translating involves reproducing in the receptor language the closest natural equivalent of the source-language message in terms of both meaning and style (Nida & Taber, 1982). The author referred to translation as a 'science', the statement being rather revolutionary for that time as it contradicted the so-called 'grammar translation' method which was widely used in the first half of the 20th century and focused on learning the grammatical rules of the target language as a cornerstone for successful literal translation (Munday, 2009). Translation exercises were considered critical for learning a foreign language and reading foreign texts. The method later lost its popularity as the communicative approach emerged in the late 1960s – early 1970s. The communicative approach focused on the natural ability of students to learn a foreign language and attempted to represent the daily classroom routine keying in on the spoken language instead of using sentences that were out of context. As a consequence, the new approach rejected the method of grammatical translation in its classic form.

In the second half of the 20th century, with a number of new linguistic achievements, a new generation of scholars managed to establish a more systematic analysis of translation (Jakobson, 2000; Fedorov, 2002; Mounin, 1963). Following

'The theories on translation tried to give insight into the translation process and analyse the relations between thought and language, culture and speech'

the new theories, a new discipline of translation studies emerged. By the end of the 20th century, communicative and sociocultural approaches were at the centre of attention, and so translation came to be viewed as nothing short of a cultural phenomenon. Thus, the concept of the 'cultural turn' was another crucial advance in translation studies that warranted further investigation. It was proved that translation could not develop without culture studies, since translations enrich nations with the cultural values of other peoples. The theories on translation tried to give insight into the translation process and analyse the relations between thought and language, culture and speech. While many theories are widely discussed in scientific literature, the argument is mostly concerned with the distinctions between texts types or genres and speech types within written or oral translation/interpreting.

The Russian school of translation studies appears somewhat distinctive as the Russian word *перевод* has a broader meaning referring to both translation and interpretation, whereby the process

of translation is inextricably connected with its result. Thus, developing a translation strategy implies defining the exact meaning behind the term *перевод*. Scholars dealing with the study of translation tend to consistently underline the dichotomy of this two-facet phenomenon, which represents both the process of transferring information and the result of this process – the

translated text. However, some scholars invest translation with extra characteristics indicating some special traits that make it a unique phenomenon. For example, Barkhudarov (1975) considers translation an interlingual transformation, a replacement of the source text (ST) by the target text (TT), with the meaning of the source text remaining unchanged (see Table 1).

Table 1

Approaches to explaining translation

RESEARCHER	EXPLANATION OF TRANSLATION	CHARACTERISTICS OF TRANSLATION
Fedorov (2002)	Translation is effectuated through a number of transformations with comparative analysis prevailing	A process, outcome (result of this process), combination of linguistic & literature approaches
Barkhudarov (1975)	Translation is defined as interlingual transformation	A process, outcome (result of this process), content (meaning) as the most important aspect
Shveytser (1973)	Translation is part of intercultural communication	A process, outcome (result of this process), cultural aspect
Retsker (2004)	Translation is about finding a proper equivalent	A process, outcome (result of this process), dependence on context
Komissarov (1997)	Translation is bilingual communication relying on the use of translation equivalents (levels of equivalence)	A process, outcome (result of this process), special type of speech activity including listening/speaking or reading/writing
Minyar-Beloruhev (1996)	The key aim of translation is to transfer information	A process, outcome (result of this process), invariant
Latishev (2005)	Translation is bilingual communication which has to be referred to as monolingual	A process, outcome (result of this process), social factors
Lilova (1985)	Translation is a linguistic phenomenon with written or oral transformations constituting its main	A process, outcome (result of this process), phenomenon of culture

‘Besides, scholars mention translators unwilling to investigate the theoretical basis of their work, thus reducing it to a ‘mere practical skill’

Thus, translation is recognised as an act of culture-specific communication, in which case a translator is viewed as the ‘first reader’ of the other culture described in the foreign-language text that they need to present in the target language. With the target audience having no access to the original, adequate translation implies major responsibility in bridging the cultural gap, which is why a translator needs to be aware of both translation strategies and cultural specifics applicable to both languages.

The didactics of translation as a part of translation studies has received less attention as for a long time the ability to translate was considered a matter of natural skill, and the teaching of translation has been described in terms of general recommendations. Some researchers even mentioned a big gap between translation theory and practice (see, for example, Newmark, 2003; Burbekova & Nurzhanova, 2014; Bell, 1991). Besides, scholars mention translators unwilling to investigate the theoretical basis of their work, thus reducing it to a ‘mere practical skill’ (Shell-

Hornby, 1988).

Considering the dichotomy of translation, the process and its product, translation strategies can be divided into two major categories – strategies relating to what happens to the ST & TT and those relating to what happens in the process of translation. Examining the process of translation, it is crucial to factor in the transformations that need to be applied to secure adequate translation, while product-related strategies result in TT evaluation and can be described in terms of equivalence and the ways to achieve it.

By the 1960s, Western Europe had already developed a number of specialised institutions offering specialised teaching programmes, and Moscow Linguistic University (with its translation programme dating back to the 1930s) integrated translator training into independent foreign-language institutes, a model that still exists in Russia and some central European countries. In the 1990s, more and more educational institutions appeared in Russia to offer special translator teaching programmes. However, there is still high demand for qualified translators especially in certain fields of science. The current system of translator training in Russia can be divided into two educational trajectories – educational programmes offered by linguistic universities and educational programmes offered by non-linguistic universities (Figure 1).

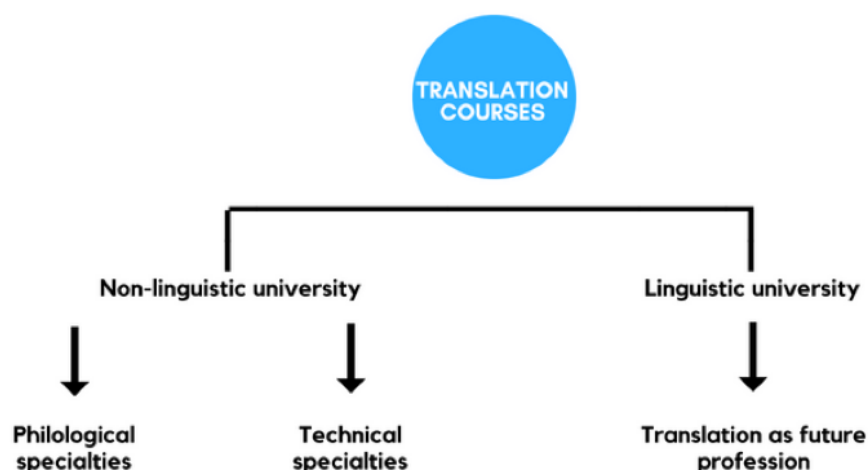


Figure 1. Russian system of translator training

One should distinguish between teaching translation for philological and technical departments, the latter being under-studied in scientific literature especially with regard to Chemistry departments. Teaching translation in ESP classes should be based on a specific methodology to be applied to Chemistry majors, as well as a specific curriculum, in order to equip both students and teachers with all the necessary facilities for adequate translation classes relying on the interdisciplinary principle and factoring in students' knowledge and skills. It should include a special guide to translation theory and practice, the teaching of chemical terminology, scientific text analysis, cultural studies, etc. The latter covers issues associated with organising and running research in Russia and other countries, familiarising oneself with the differences in academic writing in Russian and in English, and

getting to know the cultural differences within word/term formation. Thus, by and large, teaching translation in non-linguistic universities implies pursuing the key objective that brings to the forefront students' ability to use the language in the culturally determined professional dialogue.

Traditionally, scholars identify the grammatical, lexical and sociocultural difficulties in both translation teaching and studying. Grammatical difficulties result from the divergence in the language systems and require special attention from non-language majors in reading and translating scientific texts, the main challenge being the grammar forms not typical of the TL. To translate these forms, one has to compensate or restructure the sentence. Lexical difficulties are among the most discussed problems of translation and have to do with lack of direct correspondence

between English and Russian vocabularies. SL (Source Language) and TL (Translation Language) lexical units may interact in different ways and correspond to each other as mono-equivalents or regular equivalents, a mono-equivalent being a regular equivalent of the source language lexical unit that can either consist of a single word or constitute a phrase. However, as direct equivalents are hardly ever registered, the issue boils down to choosing adequate variable equivalents bearing the same meaning, as in 'essence' – (1) *СУЩНОСТЬ, СУЩЕСТВО; СУТЬ* (*core essence*); (2) *ЭССЕНЦИЯ* (*liquid essence*). Notably, it is also not uncommon for terms to be polysemantic or monosemantic and form word combinations with no direct equivalents, in which case a search for substitutes becomes ever more complicated. For example, the chemical term *oxygen* has only one direct equivalent in Russian – *кислород* – and does not cause problems in translation, while the word combination *oxygen bag* is translated into Russian as *кислородная подушка*, where the word *подушка* corresponds to English *pillow*, thus creating a mismatch.

Words lacking equivalents signify notions missing in the target language and culture and are sometimes called 'untranslatable'. Yet by the end of the 20th century, the problem of untranslatability was dethroned (Barkhudarov, 1975) as scholars demonstrated that any language was equipped with a sufficient number of

instruments to describe any cultural phenomenon even if it was not represented in the target language. Thus, when it comes to cultural gaps, the issue is reduced to addressing the so-called sociocultural differences (Byram & Zarate, 1994; Aldrich & Yang, 2012). Translation can be viewed as bilingual communication, whereby the translator is invariably affected by the system of another language, and this is where the phenomenon of interference emerges.

Interference, essentially referred to as the impact of one language on another in the context of bilingualism, can affect any level of the language and is most prominently pronounced in cases of asymmetric bilingualism (when one language dominates the other). Interference is most markedly manifested at the intonational level, being the first sign of the difference between a foreigner and a native speaker. Interference is also quite commonly registered at the lexical level, where it emerges due to the discrepancies in the relations between the signifying, signified and sign units in different languages, also manifested due to associative differences, discrepancy of lexical compatibility, etc.

Interference causes distortions of grammatical meanings in translation, also being the reason for incorrect choice of syntactic structures, word order and punctuation errors. However, the most fascinating and complex manifestations of interference are those emerging due to discursive

rather than systemic discrepancies, in which case a properly constructed speech in a foreign language does not incorporate the meanings or notions that are most likely to have occurred in a native speakers' speech and vice versa.

Translation is a special kind of bilingualism, a fact of conscious opposition to interference, for in translation the language does not emerge as a semiotic system, but rather as a text. The translator deliberately suppresses the attempts of the currently passive language system to put on a certain material form. For example, the so-called 'false friends of a translator' tend to reveal a clash of cultures in translation and pose a threat to overconfident language users prone to false cross-patterning of language elements typical of two different languages. This generates numerous semantic calques and cases of violations of lexical compatibility and stylistic agreement in the course of translation. Difficulties in translation have to do with the complex nature of the process and have to be taken into account in developing new strategies for teaching. Today, scholars consider translation strategies as a set of stages that help build a special model in compliance with educational tasks.

The key task of higher educational institutions is to ensure readiness, competence, professional integrity, and the ability of specialists to actualise their professional skills in practice using the

chosen model of training (Garbovskiy & Kostikova, 2012). Opposed to the former qualifications approach, a competence-based approach forms a methodological framework for lifelong learning (LLL) based on competences for the different undergraduate degrees offered in European countries, using comparable definitions of learning results, competences, abilities, and skills.

4. STUDY AND RESULTS

While competence in translation can have a different number of components, most scholars agree that it should include a number of components that factor in special knowledge and skills representing each competence. Each skill is formed step by step, whereby students' training depends on their language competence and is interconnected with their basic chemistry course. Notably, competence in translation takes on different forms with language and chemistry majors, and so with the latter it is crucial to start the training with the so-called pre-translation period, which involves introducing pre-translation exercises in the native language in order to facilitate target-setting, operational, evaluating and written translation skills (Robinson, 2003). Thus, competence in translation can vary, depending on the tasks of training, and to understand the hierarchy of the corresponding skills one will have to consider three stages of the translation process, which are pre-translation, translation, and editing (Table 2).

Table 2

Cross-reference of translator skills and translation stages

SKILLS	EXERCISES/TASKS	SL/TL
PREPARATION		
Monolingual skills	Find the most adequate translation from several translations offered (both professional and student translations are acceptable)	TL
PRE-TRANSLATION		
Monolingual skills	Analyse the article (branch of science, type of investigation, etc.)	TL
Bilingual skills (reading, rendering, interpretation)	Think about the title of the article, try to guess what it is about Read the article, find key words and phrases Find information presented through the key words and phrases Translate the title, discuss the ideas it highlights Make a plan of the text Write your abstract	SL/TL
TRANSLATION		
Bilingual skills (overcoming grammatical, lexical & sociocultural difficulties)	Translate sentences with grammatical phenomena that are absent in Russian Find and translate the terms, explain your choice Find and translate sociocultural items (abbreviations, proper names, etc.) Translate the abstract Translate the text into Russian Make a summary translation	SL/TL
EDITING		
Monolingual skills (TT evaluation)	Edit your translation, explain your corrections Find mistakes in translation that break the norms of TL Change grammatical composition of the following sentences Check other students' translations Compare your work with your peers' translations Vote for the best translation	TL

All skills can be divided into monolingual and bilingual. Monolingual skills are crucial in evaluating the translation as a product and assessing its adequacy against the original text. They also correlate with translation quality consistent with the norms of the TL. Notably, chemistry majors encounter a fair amount of difficulty in the editing process, which might be

because they mostly deal with chemistry-related equations, figures, data, tables, etc. and don't have a solid language background. This is why, with non-language majors, it seems reasonable to introduce a comparative analysis of Russian and English scientific articles, as well as a special preparation stage to analyse and compare professional and student translations.

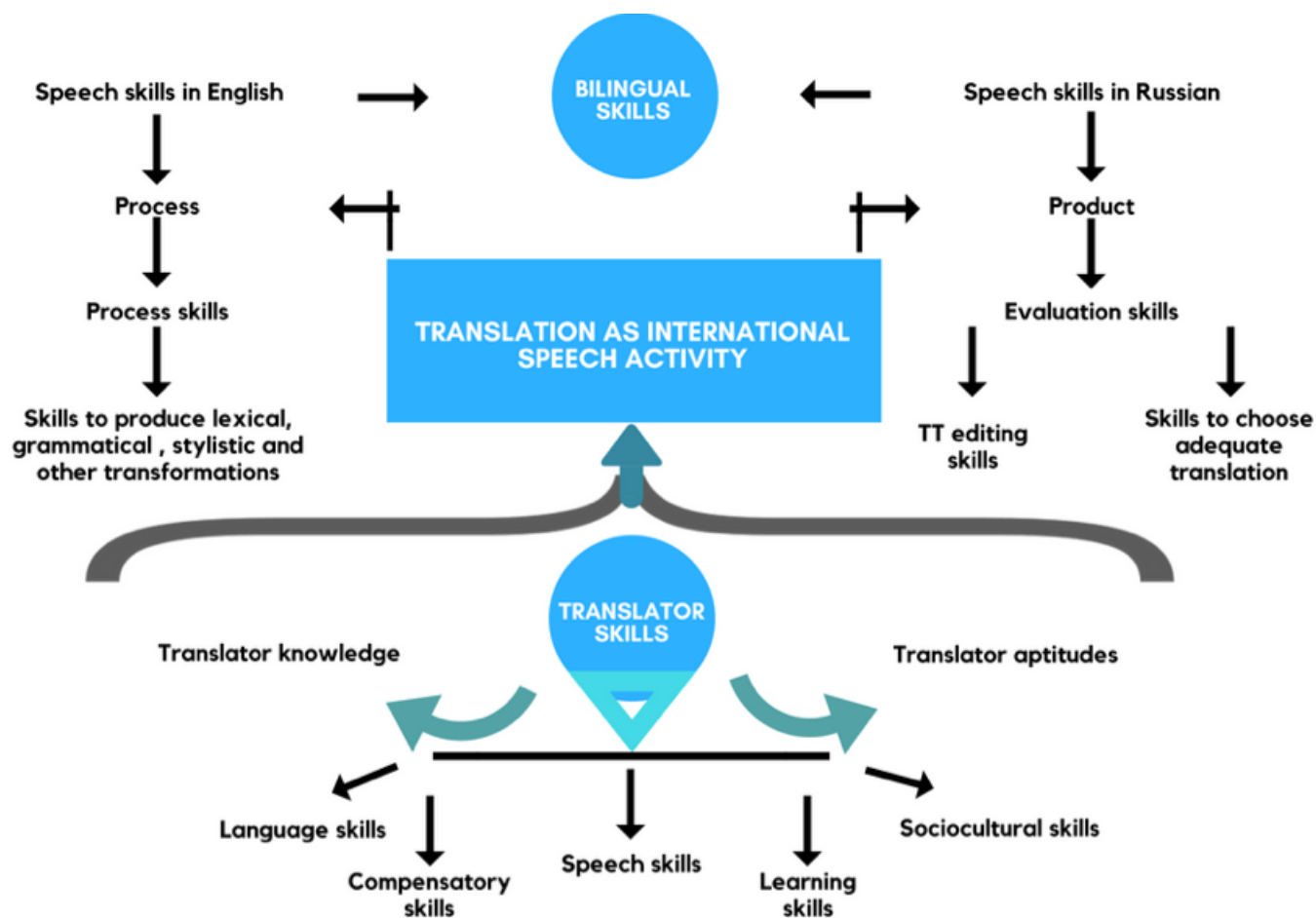


Figure 2. Hierarchy of translator skills

Figure 2 shows the hierarchy of translator skills whereby bilingual skills are accountable for the process, and monolingual skills are the ones 'responsible' for the end product and editing.

The above-discussed strategies were tested out with MA and post-graduate students of chemical departments (including the departments of Biochemistry, Organic synthesis, etc.) of Moscow Technical University. Students' progress was evaluated via quantitative and qualitative methods of analysis. Quantitative evaluation was premised on a questionnaire completed by the students while delivering their term task (English-to-Russian translation of research papers published in recent issues of chemistry journals).

At the onset of the term, the students were asked to specify the difficulties they faced while reading scientific articles by listing their problems and marking them as grammatical, lexical, etc.

At the end of the term, students were asked to indicate the coping techniques they could now use to handle the specified difficulties.

The respondents were divided into groups of 10 to 12 students, and the study was conducted after the students had learned and practised the translation techniques, while two control groups followed the regular curriculum. The respondents were required to (1) translate a paper from English into Russian,

(2) make notes on the translation techniques used, (3) edit the translation and discuss it with other group members, (4) analyse translation strategies and procedures used and (5) record their analysis in short reports.

The qualitative method relied on scientific article analyses and students' short reports, which were due one week before the final test. The final test was taken by the students, including those not taking part in the experiment. Students were required to translate a short scientific article in the classroom (1800 symbols) with further analysis.

The experimental results showed that students taking part in the experiment made fewer mistakes (about 20-30%) as compared to students who followed the regular curriculum. Besides, students taking part in the experimental study appeared more capable of finding a proper translation solution.

The quantitative method also relied on data analysis summarised in Table 3 below. Upon translating the article, the students were asked to complete a questionnaire of 10 items addressing the problems they faced in the course of studies.

All respondents were divided into Group 1 (those having participated in the experiment), and Group 2 students (those having followed the regular curriculum).

Table 3

Problems and percentage ratio of common mistakes in translation

PROBLEMS	PERCENTAGE RATIO	
	GROUP 1	GROUP 2
Understanding the idea of the text	9%	13%
Choosing appropriate word meaning	31%	39%
Translating applied/new chemical terms	53%	69%
Translating long and complicated grammatical constructions	28%	41%
Translating proper names	36%	66%
Understanding and translating figures and schemes	15%	23%
Translating scientific words and word combinations	27%	36%
Translating/rendering sociocultural information	38%	64%
Finding Russian equivalents for English terms	41%	67%
Interpreting the text in Russian	29%	52%

Table 3 highlights some lexical, grammatical and sociocultural problems that ESP students may face, including translation of proper names (36% vs 66%), complicated grammatical structures (28% vs 41%), etc., the most common roadblock being manifested in polysemantic lexical units and terms. Prevalence of the referential function can pose another major challenge to the students who are expected to have a good command of the technical terms and a sufficient understanding of the subject matter. However, comprehending the key idea of the text was not marked as one of the greatest challenges and neither group experienced too many difficulties (9% vs 13%) as they knew the subject matter from their studies in chemistry

and applied sciences. All in all, the summary indicates that Group 1 students faced fewer difficulties of a lexical, grammatical and sociocultural nature. Thus, the most common problems faced by non-language majors in translating scientific texts can be overcome by implementing a special course in translation incorporating pre-translation, translation and editing stages.

5. DISCUSSION

Translation of scientific and technical texts has a very important role to play in the age of revolutionary technical progress, which is why an in-depth theoretical study of the specific features

of technical translation is one of the major tasks of translation theory, while training of technical translators poses a major practical problem. With the rapid development of science and technology, there is a new demand for specialists who are able to understand and, if needed, translate scientific literature from English into their native language. The current trend in translation teaching implies that these specialists are not professional translators but graduates of non-linguistic (technical) universities with special training in technical and scientific translation.

Since the late 1990s, Russian scholars have put forward strong arguments in favour of moving translator training away from general modern-language programmes to translator training as part of a special subject including technical subjects as well. However, it is often challenging to implement such a model of training in practice due to a number of reasons, one of them being department diversity within one university.

Thus, for example, Moscow Technical University houses 16 chemistry departments, each with its own field of study, and yet in practical terms they cannot have their own individual translator training programmes, which is why a cross-functional programme for non-language majors supported by the foreign languages department with possible participation of the technical teaching staff would be a reasonable solution to

the problem.

To understand the greatest challenges faced by students in translating scientific texts, it was imperative to consider lexical, grammatical and sociocultural types of challenge. While these are described in detail in scientific literature and methodological studies, ESP classes can pose specific challenges due to the type of bilingualism involved in teaching non-language majors and their academic curriculum with its dominant technical focus. To acquire competence in translation, they have to follow a special curriculum developed in view of their abilities and demands to incorporate stages of translation and the hierarchy of skills developed at each of these stages.

Although traditionally used in non-linguistic departments as a way of checking language skills, translation tasks have increasingly been seen as training activities in themselves, building special skills that are specific to a certain type of translation. In this respect, it seems reasonable to introduce an extra stage incorporating comparative analysis of Russian and English scientific articles.

The exercises and tasks offered in this study cannot cover all the range of problems faced by non-language majors but they can form a basis for developing translator competence comprising a number of skills and abilities. To develop these,

the teacher should always bear in mind that technical translation contains a set of specific terms making translation of technical documents a specific kind of work that rests upon students' knowledge of chemistry as a science.

As to the classroom activity, it is rather important to diversify classroom work. The basic model can involve individual students translating their articles and then reading them out for their peers for evaluation. This class activity should be supervised by the teacher, with other students proposing their alternatives. Students can also translate their articles in pairs or small groups working on the same subject in one of the fields of chemistry. This work is rather fruitful when students come across new or difficult terms as they can cooperate and

work out the proper solution. To make this class activity more efficient, chemistry professors can be invited to help evaluate students' translation and give some recommendations as to the terminology used. Another helpful alternative would be to invite PhD students working on the same problem.

6. CONCLUSION

A course in translation should be viewed as an essential component in training non-language majors taking ESP classes as it imparts knowledge relevant for their future professional activity. Despite a number of challenges that concern pedagogical practice, curriculum design, and other matters, students of non-linguistic universities can now be trained to use translation skills for the benefit of their future careers.

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