



## Intensive Language Learning at Technological University for Integrating into Global Engineering Society

Elena Semushina<sup>1</sup>

Elvira Valeeva<sup>2</sup>

Natalia Kraysman<sup>3</sup>

<sup>1</sup> Associate Professor, Kazan National Research Technological University, Russian Federation.

<sup>2</sup> Associate Professor, Kazan National Research Technological University, Russian Federation.

<sup>3</sup> Associate Professor, Kazan National Research Technological University, Russian Federation.

### ARTICLE INFORMATION

Original Research Paper  
Received August. 2019  
Accepted October. 2019

#### Keywords:

intensive language learning  
international  
on-line assessment  
translation

### ABSTRACT

Today, a graduate of a technological university is likely to become a competitive specialist if profound knowledge of the subject is combined with the ability to communicate using a foreign language. One of the aims of Russian engineering education is integration into the global system of education and technology. One of the ways to improve international cooperation is to give an opportunity for students of engineering specialties to study abroad and come back with new professional knowledge. Kazan National Research Technological University (KNRTU) developed the program of intensive language learning to provide better integration of future engineers into the global engineering society. The program of intensive language learning exists in two forms; both are presented in full-time and distant forms: free classes for students and paid classes with profound study include not only the language courses but the theoretical ones. A number of students taking part in the program is rising which shows a constant interest. The program that makes them interested most of all is a Master's degree program.

### 1. Introduction

Today, a graduate of a technological university is likely to become a competitive specialist if profound knowledge of the subject is combined with the ability to communicate using a foreign language. Taking into account a significant overloading of students, the introduction of distant learning elements is necessary to improve the process of English training.

Contemporary Russian engineering education aims at integrating into the global system of education and science. For example, in 2012, "Top 100" program (the best 100 universities in the world) supported financially by the Russian government was introduced. The program aims at international recognition of Russian education and science. In 2015, by results of all-Russia contest 15 universities were selected to take part in the program. In 2016, other six institutions of higher education entered it as well. The institutions are to present their strategy where one of the most important issues is envisaged intensity of international cooperation. By 2020, five Russian institutions of higher education are supposed to enter the list of 100 best universities in the world. In an attempt to achieve the aim, Russian universities turned out to come across the following problems:

- low publication activity in international scientific journals,
- problems with participation in international events (conferences, forums, research projects),
- absence of subjects taught in a foreign language (English) that can attract foreign students.

That is why the following aims are assigned to institutes of higher education in the Russian Federation to get the international recognition:

- teaching of a foreign language for special purposes (for example, for chemical specialties),
- increasing number of major and minor educational programs,
- developing intercultural competence of students and staff,
- intensifying international cooperation.

One of the ways to improve international cooperation is claimed to give an opportunity for students of engineering specialties of studying abroad and coming back with new professional knowledge, what in its turn demands a profound knowledge of a foreign language. Besides, the students are to have a chance to be aware of the innovations in their major, that appear abroad, write scientific papers and submit their research at international conferences. According to the new requirements of global education the roles of faculty staff have changed (Valeeva, 2016). Nowadays, the knowledge of foreign languages is necessary for any university professor to be successful both in scientific and educative affairs.

To serve this goal, in 2014, the Council of Kazan National Research Technological University (KNRTU) determined the main prospects of improving language study and international cooperation, which include intensive training of foreign languages (English, German, French) of students and staff members.

## 2. Objectives

As contemporary world demands from a modern engineer the ability to work in conditions of industry and science internationalization, the minor education should supplement to the major and fill the gaps in specific knowledge. This process reflects the principle of continuity of education and improves the quality of future engineer training.

According to the program of the major, a foreign language is studied for two years, one class a week. The student is supposed to achieve the following levels of the language: General Language (B1, B2) or Language for Special Purposes (C1). The result mainly depends on the initial level of students. In some cases, to be an integrative part of international scientific society a future scientist has to possess the knowledge of the language that can allow him to communicate fluently (Language for Academic Purposes). Besides, the increasing number of programs that are aimed at getting double degree demands competent teaching of chemical subjects using a foreign language.

Popular exchange programs with full financial support contribute to international cooperation as well: Fulbright, Algarish, Global education, etc. To apply for financial support provided by these grants, a student is obliged to pass one of the following international standardized exams – TOEFL, IELTS (English), DELF (France), etc.

For the purpose of better international integration of future engineers, the programs of intensive language training were developed and implemented in Kazan National Research Technological University. The claimed aims are the following:

- to let the students participate in international conferences;
- to pass international exams for the purpose of taking part in exchange programs (mostly to get a Master's degree).

Three languages are studied intensively: English, German, French, but a number of languages can be extended. In 2014, KNRTU signed an agreement with Embassy of France, the following higher education

institutions of France as Institut de Recherche de Chimie Paris, Paris-13 University, that resulted in joining the network of language partners and, in its turn, promoting the French language and culture, conducting research in engineering (Kraysman and Valeeva, 2014).

### 3. Results and discussion

The program of intensive foreign language training operates in two forms. Both types are presented in full-time and distant forms. The experience of operating distant programs “Ana Tele” and “Translator in the sphere of professional communication” in Kazan Federal university was analyzed (Gimaletdinova and Khalitova, 2016, Semushina and Ziyatdinova, 2015). Assessment is mostly operated in on-line form as it leads to reducing time spent on the performing, quick feedback and analysis of results, individualization of the assessment process, and developing of self-discipline. As personal interaction between a student and teacher may be limited, the on-line assessment in the form of testing that is able to measure the knowledge of students effectively stands forward. It should perform not only the function of control but have educating potential as well.

1) Free classes for students of KNITU.

That methodological context is worked out to prepare students for international exams or writing scientific papers in English, French, German. The students are selected from the first and second year based on recommendations of their scientific advisers. The study lasts for 2-3 years, two classes a week. The students are selected according to their initial level of knowledge recommended to be not less than intermediate. Special language centers (English, French, German) equipped with audio-visual facilities, references, and textbooks are used to provide a high level of teaching and intensification of international activity. Foreign specialists are invited to work with students there. Thanks to exchange programs (Fulbright, for example) annually two foreign specialists (from the USA and France) work in the centers that improves quality of teaching, enhances intercultural competence of students and staff members of KNRTU.

The language study is organized in the framework of two steps:

A) Language for Academic Purposes (the first year of study)

The main aim here is to teach students how to write scientific papers and present their research abroad (Valeeva, 2016). It is necessary not only to study professional language, but also to master communication language because not every talented future chemist may have initially high level of the language as teaching foreign languages in provincial schools of the Russian Federation has much to desire. Not to prevent such students from being a part of international scientific society a basic course is supplemented by correctional (additional) elements in distant form that can help such students with low level of knowledge but high motivation master their knowledge quickly.

The scientific papers in foreign language are prepared under supervision of scientific advisers and contain the aspects of their scientific research. One of the main issues to be trained is academic writing that is the basis for proper construction of speech according to the rules of stylistics, lexicology and grammar. The students have a certain experience of publishing their works in Russian journals that is why the specialized vocabulary is familiar for them. This fact helps the students to choose the adequate term in a foreign language and even enlarge their knowledge in the subject itself. The students studying at the courses are welcome to work as volunteers at international conferences held in KNRTU.

Two types of assessment are used to evaluate the results.

- regular, interim (tests in distant form),
- final (academic writing and speech).

Proper assessment is to evaluate a maximum number of students in a minimum period using representative but limited volume of material. The assessment has to correspond to the objectives of the course, be regular, targeted, objective, systematic, effective, planning, economic, and clear (Semushina, 2017). On-line testing stands forward when assessing the knowledge in the framework of the program.

The tests are made taking into account the following criteria of efficiency of the test:

- validity,
- reliability,
- scorability,
- economy,
- administrability,
- readability.

The following drawbacks were marked by the participants of the program when the tests were used for the first time (31 students were interviewed):

- the number of options should not be more than four;
- testing tasks must be of the same type in the framework of one test;
- grammatical and lexical peculiarities shouldn't help to choose the right option.

Besides, on-line testing is supposed to be well organized:

- a number of tasks and time to fulfil to be known beforehand;
- demo version to be available;
- only one task to be displayed;
- simple interface;
- simple input method;
- quick feedback.

The content of the test is to:

- be consistent with the objectives;
- contain the most important elements of the test;
- be interconnected with form;
- contain accurate information;
- have a number of tasks not more than 30;
- be systematic and balanced;
- contain the variants of the text of equal complexity;
- have increasing difficulty;
- contain logical, short testing tasks (Veksler, 2015, Zharirova and Kartushina, 2017).

B) Training for international exams TOEFL, IELTS, DELF (the second year of study).

The students intending to take part in international exchange programs master the following aspects of the language at the courses:

- speaking,
- writing,
- reading,
- listening.

One of the most important issues is that only the members of the staff who have passed the international language exam by themselves are allowed to work as teachers here. Training goes through mastering certain skills of four above-mentioned aspects that are checked by regular testing in the form of mini-tests (two tests are offered

during the term). Difficulty of the tests is increasing from test to test, which are homogeneous and paper-based or computer-based. Final assessment is presented in passing international language exam, which is paid for by KNRTU in case a student is from a family with a low income.

2) Paid classed with profound study not only of the language but theoretical subjects.

The program is aimed at training high-qualified specialists who obtain not only knowledge of the major but also professional translation skills. The applicants should possess the level of language knowledge not less than B1 (The Association of Language Testers in Europe).

The main peculiarity of the program is that the students are selected and organized in groups according to their major (chemical engineering, nanotechnologies, petroleum refining, etc.) which allows them to focus successfully on a professional language when training. Graduating from the program a student has two qualification: the chemical one (according to their major) and “Translator in the Sphere of Professional Communication”. The gradulators have the skills of interpretation and translation, are communicatively competent and ready to pass standardized international language test. The study lasts two years, five classes a week. The students are welcome to work as interpreters at Russian and International conferences.

The program started in 2015 with only 15 students eager to train. In 2016, the number of students doubled (35), and in 2018, 45 students entered the program which prove the success of the approach.

The curriculum consists of the following subjects:

- Practice of Speech - the course aims at forming linguistic and communicative competence training the skills of reading, speaking writing and speaking.
  - Practical Skills of Translation – skills of translation are trained using different kinds of tests. The translation itself is a creative process, as the student must demonstrate the ability to understand and interpret the text, the knowledge of translation skills, norms, styles, and background information. That is way the use of tests as assessment here is limited.
  - Language for Special Purpose – students study professional terminology of their major.
  - Theoty of Grammar - systematic information of grammatical system including grammatical categories is presented.
  - Interpretation - the main types and methods of interpretation are analyzed, synchronous and subsequent types of interpretation are trained, switching skills using correspondences as well.
  - Theory of translation - theoretical aspects of translation are analyzed such as use of correspondences, transformations, types of equivalence, genre-stylistic characteristics of the text.
  - Lexicology - construction and functioning vocabulary are studies as well as etymology and meaning of words in the context.
  - Stylistics - the style and stylistic coloring are studied, the students are taught to use all varieties of style in speech.
  - Intercultural Communication – the main rules of communication that can improve a communicative act are studied.
  - Business Language - the main characteristics of business communication are studies (types of documents, lexico-grammatical and stylistic characteristics of Business English).
  - Country studies - information about geography, history, culture, religion and art of the country is presented.
- Besides, in 2016, the following additional subjects were introduced:
- Presentation Skills – the ways of presenting successfully the results of scientific research are analyzed.
  - Training for Standardized International Exams – students are trained for TOEFL, IELTS, DELF.

Assessment of knowledge is performed in the form of regular and final evaluation. Regular evaluation consists of passing exams on the core and optional subjects of the curriculum. The final project here is a scientific research presented in the foreign language. Presenting the project, the students have a chance to demonstrate the following aspects of their professional and linguistic competence:

a) Speaking

A student should be able to communicate fluently with the examiners and react vividly answering the questions. This part of the presentation is the most difficult one and demands careful and long-lasting training. Imitation of a discussion is strongly recommended here as an exercise, which follow a range of training such as translation on the spot, debates and spontaneous interpretation.

b) Writing

Accurate writing is necessary to make a perfect slide. The peculiarity of the program is that it is mostly aimed at independent work of a student, which involves significant amount of written translation.

c) Presentation skills.

A graduate has to be aware how to present the research to advantage according to the following rules of presenting research:

- to be prepared,
- to seem relaxed,
- to pay attention to details,
- to convey a positive attitude,
- to use terms, etc.

d) Knowledge of professional terminology

Training is conducted during the classes of Professional Translation, Interpretation, Theory of Translation and Practice of Speech in a distant and full-time form.

Preparation of the project in the framework of language teaching includes two stages:

- self-study (a student gathers the material for the presentation basing on the major and structures the presentation paying attention to the recommendation of the scientific supervisor),
- class (full-time) training (a student develops the skills to communicate with the examiners and trains the basic aspects of the language: grammar, vocabulary, writing, speaking). The most important forms of training prove to be the following: free discussions (online or live) where students master their use of spontaneous speech; role-plays that can be considered the rehearsal of presentation.

A typical presentation lasts for 10 minutes and is usually designed with the help of Power Point and Prezi programs. The topics with reference to the scientific research are strongly recommended.

A high initial level of the language, strong motivation of the students, their involvement in science and active participation in scientific events allowed us to achieve the objectives of the program “Translator in the Sphere of Professional Communication”.

KNRTU developed intensive language teaching programs for the staff and provides them in two forms:

a) 20 staff members a year master a foreign language in the framework of the program “Foreign Languages for Professional Communication” (250 classes a year).

b) Approximately 100 staff members are trained to teach their subjects in a foreign language (English, French, German). The participants are motivated financially to succeed. The assessment is performed in the form of exam that can be an on-line test or live talk with the examiner.

#### 4. Evaluation

A number of students taking part in the programs is rising which shows a constant interest to the study of foreign languages. In 2015, there were 108 students (free classes) and 15 (paid classes). In 2018, more than 228 students were eager to enter free classes and 45 students enrolled to the paid classes.

The approach described resulted in significant increase of a number of scientific papers in international journals and presentations at international conferences. For example, the papers of students of KNRTU were published in the following journals indexed in Scopus database:

- «International Polymer Science and Technology»,
- «Journal of Physics: Conference Series» (polymer chemistry and physics),
- «Phosphorus, Sulfur, and Silicon and the Related Elements» (organophosphorus chemistry),
- «AIP Conference Proceedings» (polymers and nanostructures).

Now the students, masters and postgraduates have an opportunity of being aware of new trends in science as they can study recent works of their foreign colleagues. In addition, the number of staff members publishing their works in foreign journals raised significantly as well.

The Department of Foreign Languages for Professional Communication of KNRTU closely cooperates with “Alliance Française de Kazan”, the Center of the French language and French culture. Due to the knowledge of French, students of KNRTU constantly participate in language competitions organized by “Alliance Française de Kazan” and Embassy of France in the Russian Federation and are rewarded with educational trips to France. Students with knowledge of French work part-time in French companies, such as "Auchan", "Leroy Merlin", "Danone", "Dekathlon", "Renault", etc (Kraysman and Valeeva, 2014).

In 2013, only five students passed the international exam and went to study abroad. However, in 2015, more than twenty students became participants of international exchange programs. In 2016, seventy-six students went abroad for training or as participants of international exchange programs. The program that makes them interested most of all – to get a Master’s degree abroad. Every year five students study informational technologies in Merseburg (Germany) and get double degree in their major. The most popular countries for students with a profound knowledge of English and German are the following:

- Federal Republic of Germany (Stuttgart, Altair Engineering GmbH; Dusseldorf, Exhibition K-2016; Frankfurt; Bremen; Berlin),
- Denmark (Copenhagen, technical University of Denmark),
- Canada (Calgary, University of Calgary),
- Bulgaria (Plovdiv, University of Plovdiv), etc.

Financial support for the students is provided through grants. The most required grant programs Fulbright (the USA), Algarish (provided by the Ministry of Education and Science of the Republic of Tatarstan), Global education, DAAD (Germany), etc. Fulbright organizes a summer school for students and staff members at KNRTU. Those students who study French participate in programs supported by the Embassy of France (Henri Poincaré grant), for example, in 2016, two students received the grant, in 2017 - three students, in 2018 – three students. Some of them studied in Brittany and Brest.

To apply for exchange programs, students are to pass standardized international exams. In 2014, three students successfully passed DELF (French), two students DAAD exam (German). In 2016, eight students passed TOEFL/IELTS (English), five students DELF, standardized exam in German – four students.

The number of staff members participating in academic mobility rose from seventy (2009) to approximately three hundred (2016), taking into account exchange programs, participating in international conferences abroad, mastering and training the knowledge of their major in leading international universities. In the framework of

TEMPUS IV project “Reform of High Education in Biotechnology” (2015/2016), a curriculum was worked out with subjects studied in English:

- Experimental Methods for the Creation and Study of Bionanoobjects;
- Immobilization of Enzymes;
- Intercultural Professional Communication in a Foreign Language;
- Physical Chemistry;
- Principles of Special methods of Biomass Processing into Advanced Materials;
- Technical Thermodynamics and Heat Transfer;
- Models and Methods for Decision Support, etc.

## 5. Conclusions

The program of intense language study operated in KNRTU is envisaged to develop further with support of the administration and staff:

- The range of distant elements is widening to let those students and staff members who have no opportunity to be present at the lessons master the language.
- The increasing number of students who are eager to pass the standardized exam is supposed to result in growing number of exchange program participants that in its turn can lead to intensification of international cooperation.
- The work of preparing papers and presentation should continue as not only students now can use the language fluently, but their scientific supervisors as well.

Therefore, to become a good professional for a modern engineer is necessary not only to have integral professional competences and good knowledge of the language but professional translation skills, intellectual, communicative and creative crafts (analysis, forecasting, finding compromise, and etc.). International cooperation with foreign universities stands forward. The program worked out in KNRTU in all its forms contributes a lot to develop quality of engineering education according to international standards.

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