LOOK ACADEMIC PUBLISHERS
OPEN ACCESS

INTERNATIONAL JOURNAL OF ENVIRONMENTAL & SCIENCE EDUCATION
2017, VOL. 12, NO. 1, 25-34

The Experience of Teaching of Descriptive Geometry and Engineering Graphics in Russian language as a Foreign Language

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ABSTRACT

The article considers the peculiarities of training foreign students subject "Descriptive geometry and Engineering Graphics" in a modern engineering university of Russia. The relevance of the problem conditioned by the fact that virtually there are no special studies of teaching Descriptive Geometry and Engineering Graphics in Russian language as a foreign language. The aim of the article is a definition of the tasks of teaching descriptive geometry and engineering graphics for foreign students in Russian language as a foreign language, create methods and didactic principles used for training. The leading study' method of this problem is the simulation method as a deliberate and organized improving process for general cultural level and formation of special competence of teachers of engineering universities of Russia, and for effectively carry out their professional activities. The study aimed to adapt of lecturers to the new conditions professional work in the field of education, the integration of professional psychological and pedagogical training of lecturers. It focused on the development of scientific and methodological support of the decision of psycho-pedagogical and organizational-methodological problems of teaching Descriptive Geometry and Engineering Graphics in Russian as a foreign language.

KEYWORDS
Russian language as a foreign language (RLFL), Descriptive Geometry and Engineering Graphics (DGEG), foreign students, competence approach, Socio-Economic Status Questionnaire (SESQ), Geometric Achievement Test (GAT)

ARTICLE HISTORY
Received 20 April 2016
Revised 28 May 2016
Accepted 9 June 2016

Introduction

This article is published in order to discuss the problem of teaching of DGEG in RLFL for foreign students learning technical academic disciplines in Russia. In future, series of publications related to higher technical education in the field of DGEG in RLFL are to be published.

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The Russian system of higher education runs difficult stage of integration into the international space, this system is transformed and adjustable under the influence of globalization, new technologies, modern economic situation. Recently, there was a significant revision of the objectives and content of education, at-going awareness that higher engineering education on the one hand can not be closed in a national framework, on the other hand - should defend national interests.

One of the leading trends in the development of higher education in the next decade will be to strengthen in internationalization, regionalization and globalization. Internationalization opens up many new and exciting opportunities for collaboration within the academic sphere and can be a powerful tool for improving the quality and innovation in different directions. At the same time, expensive, fast-changing, competitive global environment of higher education is fraught with a variety of serious risks and challenges that need to be resolved. To the globalization of higher education has become an advantage for everyone, we must provide equal access opportunities (Baydenko, 2010).

There is growing interest of foreign citizens in Russian language as a means of obtaining higher engineering education in Russia. Especially from the countries of Africa and Asia, carrying out the extraction and processing of oil and gas. in addition to the others, advocacy and recruitment of foreign students is a priority for engineering university in Russia. We believe that the appearance of students who want to improve their education in Russia, is not an accident, but regularity in the education system. This trend is not limited to Russian universities, it is "a spirit of the time".

The changes affected all spheres of the Russian education system, including special training subjects with RLFL in the engineering universities of Russia.

Academic discipline DGEG is one of the first professionally-oriented disciplines, which is trained for students in the engineering university of Russia.

Advances in the development of this discipline serve as an indicator of future professional qualified engineer, since it is impossible to imagine a professional who does not speak the language of graphics in both Russian and English. Therefore the search for the integration of English language teaching and graphic disciplines of particular relevance in the overall structure of professional competence (Khmarova, Semashko & Putina, 2014; Zheltukhina et al., 2016).

Our analysis of literature shows that the majority of researchers in the concept of "professional competence" include the following aspects: the problem and practical - recognition and comprehension of the situation, setting and effective implementation of the goals, objectives, standards in a given situation; meaning - professional understanding of the situation in the social and cultural context; value - the ability to correct evaluation of the situation, its nature, objectives, targets and standards in terms of their own and universally valid values (Zimnjaja, 2003).

The mechanisms of perception of the current information system of higher education and the construction of scenarios of development depend on user-defined (Levina et al., 2016).

In the analysis of the literature we found that different types of students' testing were widely studied by researchers: evaluation of input level of students; the effectiveness of training and assessment of the achieved level of the knowledge by students; advantages and disadvantages of testing in general (Pan, 2009). The subject of the effects of examinations has long been discussed in the literature of general education (Vernon, 1956; Kellaghan, Madaus & Airasian, 1982). It has been looked at

from different points of view (Airasian, 1980; Frederickson & Collins, 1989; Cooley, 1991; Haladyna, 1991).

For instance, the washback effect was observed initially at the macro level, including different parties within the Hong Kong educational context, and subsequently at the micro level, in terms of the classroom, including aspects of teachers' attitudes, teaching content and classroom interactions (Cheng, 2005). Further, the book offers insights into the concept that a test can be used as a change agent to encourage innovation in the classroom.

The result of other study revealed that the students who were provided with feedback performed better than those provided with formative test only. The least performance came from the control group that was provided with expository teaching only without any formative test or feedback. (Ajogbeje, Ojo & Ojo, 2013).

However, we have not identified special studies relating to the teaching of the subject DGEG in RLFL for foreign students from different countries. Also, it does not sufficiently defined principles and methods of training, allowing overcoming the lack of coordination in the preparation of foreign students coming from different countries. Require improvement of educational-methodical complexes for training, for lecturers' adaptation for working with foreigners in RLFL, to the new conditions of professional work in the field of education, the integration of professional psychological and pedagogical training of lecturers.

Materials and methods

Research methods

During the study following methods were used:

- Theoretical (analysis, synthesis, concretization, generalization);

- Diagnostic (questionnaires, interviews and testing);

- Empirical (the study of the regulatory and educational-methodical documentation of engineering universities of Russia, pedagogical supervision);

- Experimental (notes forming, controlling).

Experimental research base

The studies were conducted on the basis of the St. Petersburg Mining University.

Stages of research

The studies were conducted in three phases:

- In the first stage a theoretical analysis of the existing methodological approaches in the scientific literature was carried out. We analyzed dissertations on issues, as well as the theory and methodology of educational research; highlighted the purpose, research methods, made up of experimental studies;

- In the second stage experimental work was carried out; the findings obtained in the course of experimental work were analyzed, tested and refined;

- In the third stage the experimental work has been completed, theoretical and practical conclusions were clarified, the results were summarized and systematized.

Research Instruments

Five research instruments were used for the collection of all relevant data: Socio-Economic Status Questionnaire (SESQ) and four Geometric Achievement Tests (GAT):

1. Socio-Economic Status Questionnaire (SESQ).

The Socio-Economic Status Questionnaire (SESQ) was designed to elicit information about the participants' age, sex, their parents' occupation and educational background.

2. Geometric Achievement Test.

The test was designed to assess the geometrical skills of students, other their mental abilities and intellect:

2.1. Geometric Achievement Test Before Learning 0 (GATBL0).

This test has been designed for those foreign students who have just arrived at the preparatory department of the university, and almost do not know the Russian language.

2.2. Geometric Achievement Test Before Learning 1 (GATBL1).

This test has been designed for those foreign students who had completed the preparatory department and enrolled on the first course of the university.

2.3. Geometric Achievement Test Before Learning 2 (GATBL2).

This test has been designed for those foreign students who have enrolled on the first course of the university.

2.4. Geometric Achievement Test During Education (GATDE).

The test was designed to assess geometric learners' skills during education.

2.5. Geometric Achievement Test After Studing (GATAS).

This test has been designed for those foreign students who had completed the first course of the university.

Data Collection

The scores for the items making up each scale were added together to get the total score for that scale and were later used for data analysis.

Results

The contingent of foreign students of the preparatory department St. Petersburg Mining University

At the preparatory department of the university annually trains about 150 foreign students. An important scientific and methodological problem is the study of the annual number of students and the students of the preparatory department.

Studies have shown that the bulk of the preparatory department' students - young people aged 18 to 22 years old who graduated from secondary school in his native country. Mostly they do not know Russian language or they have a basic level of conversational Russian language.

At the preparatory department of the St. Petersburg Mining University in the 2016-2017 academic year enrolled 147 students representing 30 countries. Most of them are from countries such as Afghanistan, Angola, Vietnam, Iraq, Yemen, China, Mozambique and Sudan.

The vast majority of them do not speak Russian and English. They came to study the Russian language at the preparatory department. All of them want to improve their knowledge of academic subjects such as mathematics, physics, chemistry and drawing.

Often, the first training session on plotting at the preparatory department starts with the fact that the teacher shows a pencil, write in Russian on the board the word

"pencil", then ruler, and so on. So as soon as a student arrived in Russia, he often does not know Russian at all.

In addition, many have an aim to get acquainted with the cultural traditions of Russians people and adapt to the environment in Russia. The main objective of the enrollment is to enter the first course of university next year. We found out that almost all the graduates of the preparatory department of the St. Petersburg Mining University successfully enter the university, and in most cases have success in training better than those foreign students who did not complete the preparatory department.

The contingent of foreign students of the St. Petersburg Mining University

In St. Petersburg Mining University annually trains about 500 foreign students. The number of this category of students grows from year to year. And if in 2011 the number of foreign citizens enrolled at the university were 196 persons. In 2015 the number of foreign students increased by 2.5 times, up to 474 people. The university currently enrolled the students from more than 50 countries. Depending on the level of knowledge of the Russian-language, the number of students can be divided into four groups.

1. Students who have not studied Russian or English before, or who have a basic level of spoken English or Russian before the first course. Most of these students are from countries such as Mongolia, Myanmar, Vietnam, Yemen, Iraq, Congo and others. Complicating the process of learning of these students that some of them do not speak either in Russian or English and they have not been trained on the preparatory department.

2. Students who have not studied Russian language before, or who have a basic level of Russian spoken language before the first course, but they speak English. Most of these are from countries such as China, Namibia, Ghana, Botswana and others. They are not trained at the preparatory department.

3. Students who have been trained at the preparatory department. Most of them are from Angola, Algeria, Afghanistan, Vietnam, Iraq, Yemen, China, Mozambique and Sudan. These students are already on admission to the first course well adapted to living in the city of Russia and St. Petersburg in particular. They have good understanding of Russian language, they familiar with the infrastructure of the University and with some of the lecturers.

4. Students who speak Russian satisfactorily for successful learning. They are representatives of the following Republics: Belarus, Moldova, Tajikistan, Uzbekistan and Kazakhstan, the Republic of Lithuania, the Republic of Latvia and Turkmenistan. This group can include students from Serbia and other countries.

Training foreign students the academic subject "Descriptive Geometry and Engineering Graphics" in Russian language as a foreign language at the St. Petersburg Mining University

Several researchers from Russia, including from the city of St. Petersburg, as well as from other countries, are exploring the problem about training foreign students in RLFL, in relation to their academic disciplines currently (Fetisova, 2010; Fetisova, 2014; Abramova, 2015; Baranova, 2015; Bykova, Abduladim & Kebsbi, 2015; Klenova, 2015; Kolesova, 2015; Kondrashova, 2015; Nikitina & Rogaleva, 2015; Talis, 2015).

Training foreign students in Russian Engineering University academic discipline DGEG in RLFL is an independent educational sector.

Due to the fact that the industry is on an early stage of development, a certain number of issues were identified by the scientists of the department of descriptive geometry and graphics of the St. Petersburg Mining University (Voronina & Tretyakova, 2015; Moroz, Voronina & Tretyakova, 2016).

1. Over the last decade, lecturers DGEG in RLFL were faced with new developments in their practice related to the constantly changing the contingent of foreign students. This situation requires a response from them.

We have identified that in the majority of post-graduate Russian universities they mostly have not studied methodology of training of technical disciplines in the RLFL, including DGEG for students from different countries.

The complexity of the solution to the problem lies in the fact that most of the documents governing today education sphere in Russia are aimed at training the students from Russia, not the foreign citizens. Existing methods and special trials of teaching of technical subjects usually very common for students from different countries. They do not take into account the peculiarities of perception of Russian language by other languages by students from different countries or cultures.

Thus, the need for changes to the education system and in the tutorials is evident. Preparation of such experts should be considered as one of the most important activities in all Engineering Technical University of Russia.

We are absolutely convinced that without mastering the special teaching methods lecturers must not even go into the class. Of course, an experienced instructor will use a variety of types of work in class, different educational materials to teach students how have the skills, professional knowledge, how format their competences (Anopochkina, 2013).

However, as a rule, if the lecturer just starting to work with foreign students, he has a lot of questions. How to start? How to communicate? If they do not know any Russian words and no English, how will they understand me? And this is only a small part of the questions.

That is, DGEG teaching is a very complex, laborious process. And these items are the most important processes for the further formation of the engineers' individual.

In addition, each one from preparatory departments or first courses' lecturer realizes that from the level of his pedagogical skills, will determine whether student will be succeed in the future, on a par with students from Russia. That is the work of the lecturer of DGEG requires maximum output of pedagogical and psychological effort of special level.

2. The discrepancy between the school curriculum in their native country and the country of study (in our case in Russia), poor knowledge of the Russian language, the lack of knowledge of technical terminology and grammar of scientific style of speech is extremely complicate training contingent of foreign students in technical universities in Russia. Sometimes the level of general education of a certain part of the preparatory department of foreign students is low and requires considerable adjustment before entering the university.

Unfortunately, they often chat in Russian only in the preparatory department for foreign students limiting to classroom hours and communication with each other and with the teacher. As for the first-year students it is during the classroom and communication with the lecturers and Russian students. We found that at the exit from the audience and those, and others are trying to regroup with students from their home countries and the rest of the day talking in their own language among themselves. This

is connected with the complex process of their adaptation to the university environment. And of course it reduces the effectiveness of teaching Russian language.

Preparation for training requires students to bridge the gap between available and necessary knowledge in a short time. Therefore, already in the preparatory phase of training lecturers need to start teaching scientific style of speech for the formation of students' subject-component competence.

In the process of learning the lecturers should be carried out preparatory systematic work, as a result of which students should know scientific and technical terms to learn how to write down lectures, etc.

In the process of working with foreign students it is very important that they have coped with the psychological barrier - fear of making mistakes.

We developed test items to assess the level of training of foreign students who have just enrolled in the preparatory department (GATBL0) or on the first year of university (GATBL1, GATBL2), to assess existing knowledge is depending on the level of knowledge of the Russian language. And also to assess the current (GATDE) and final (GATAS) results of their development level of foreign students during the training in the first year and at the end of the first course.

3. The difference is not only in the level of basic education of foreign students, but also in the mentality. The level of education in connection with a variety of countries and cultures from which the students come. There are possible conflicts both between themselves and between foreign and Russian students. All students must learn to behave within the framework of generally accepted norms of behavior in Russia. In addition, no coincidence political interests of students from different countries can also lead to conflicts within the band of students. That also requires careful correct intervention of lecturers. Lecturers sometimes use their mediators' skills, in addition to its core business.

As a result, lecturers in their trials, in addition to direct student teaching, should be able to take into account the personality, skills and interests of each student to be able to regulate the conflicts that arise. The lecturer should be treated with understanding to the problems of foreign students and help them get out of this with dignity. But on the other hand, should require compliance with ethical standards of behavior in the team.

4. In the selection of educational material and its introduction in the educational process must take into account the difficulties of the features of the native language of the students. Special attention should be paid to the fact that just does not exist in a particular language or diverges in the forms and methods of expression.

For example, in the study of the correct font lettering the lecturer should pay special attention to the students in particular, taking into account the interference of the National alphabets students. It should be understood that the major difficulties for students from Arab countries, China and India in that they are do not understand the Russian drawing font.

This problem will be investigated by us. After work, we will publish the results of our research and we give possible problems solutions. The main investigated problem for us now is the difficulty of perception of Russian technical terms in the field of DGEG by foreign students. As well as the complexity of the perception of national and international standards in the engineering drawing by students from various countries.

Discussions

The study recommended that lecturer need to motivate their students and help them to build positive attitude towards DGEG. We agree with scientist O.J. Ajogbeje, A.A. Ojo & O.A. Ojo (2013) that lecturers should help students to build positive attitude towards mathematics and towards DGEG in our case by providing the learners with regular diagnostic tests and adequate feedback on their test scores, but only during learning, not after last exam. Administrators should allow and provide necessary incentives for lecturers to attend seminars, conferences to keep them abreast of current research findings in teaching strategies and methodologies in order to enhance their effectiveness.

We totally agree with scientist E.V. Fetisova (2014), that despite the difference in training programs all students need the ability to analyze information, highlight the essence of the matter, to own reasoning logic, compile statistical data, iterpret the situation correctly. All these qualities are developed in the process of learning DGEG too. And they are forming students' mathematical and DGEG competence.

On the other hand if the language of mathematic is formalized, uses a large number of characters, symbols, formulas, which are standard or similar for the majority of the world's languages. Phrases used when working with mathematical texts, is also not very diverse and generally understandable and accessible to people just starting to learn the language. But our DGEG is more complicated case. For instance there are many state standards in Russia, without the knowledge of which the requirements, students will not be able to carry out drawings.

We also believe that to create an effective learning method we must take into account all the language features of training at the pre-university stage in conjunction with the features of the foreign languages. This problem is one of the most urgent, as most complaints is that foreign students are not fluent in Russian and have low mathematical training, which prevents their further training in university.

In recent years, the number of students from Arab countries increased. Scientists from the St. Petersburg Mining University, in cooperation with the students from Arab countries (Bykova, Abduladim & Kebsbi, 2015) are studying the problem of perception of Arab students Russian geological terms.

Our department of Descriptive Geometry and Graphics in cooperation with the students from Arab countries and with our students from China, are developing our translations from Russian language to their languages. And we are studying the problem of perception of Arab and Chinese students DGEG terms and standards in RLFL.

Conclusion

Concluding the article, we would like to state that nowadays:

1. In Russia actively conducted the training of foreign students.

2. Training DGEG in RLFL is an independent educational sector.

3. The solution to the problem of intersubject communications - the integration of disciplines DGEG and "Foreign language".

The main results of our study:

1. We have identified 4 groups of foreign students, depending on their knowledge of Russian and English languages, as well as the level of mathematical background and characteristics of their national education.

2. We have assumed the main common problems encountered in the DGEG in RLFL during training of foreign students.

3. We have formed general type of methodical complex for training foreign students.

4. We have developed the first part of DGEG vocabulary from Russian language to Arabic and Chinese languages.

In the course of the survey, new questions and problems to its decision appeared. It is necessary:

1. Documents regulating the training of lecturers of technical discipline DGEG in RLFL for each listed above in 3.2. group of students should be developed.

2. Lecturers' teaching methods need to be improved.

3. Principles of teaching of DGEG in RLFL, course content, educational-methodical complexes that allow surmounting the inconsistency in training foreign students coming from different countries need to be improved.

4. The requirements to the geometric skills for foreign students to be met before the preparation of foreign students when entering the preliminary and the first year of university should be developed.

The contents of this article can be useful for lecturers, adapting to the new conditions of professional work in the field of higher engineering education. And also for the specialists of education which focused on the development of monitoring the quality of education.

Disclosure statement

No potential conflict of interest was reported by the authors.

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