

G.K. Tleuzhanova<sup>1</sup>, N. Stanciu<sup>2</sup>, A.B. Mekezhanova<sup>1</sup>

<sup>1</sup>*Ye.A. Buketov Karaganda State University, Kazakhstan;*

<sup>2</sup>*Belgrade University, Serbia  
(E-mail: brunettie@mail.ru)*

## **Modeling of Language Training of the Students of Natural Sciences**

The given article is devoted to identifying the components of modeling of foreign-language training of biology students. Currently, this topic is particularly relevant, since the knowledge of a foreign language by modern specialists is a necessity in the context of globalization and provides for the formation of students' foreign language professional competence. The modeling of foreign language vocational training includes the purpose, task and content of vocational training of a foreign language; analysis of the procedural component of the pedagogical modeling of foreign language teaching; requirements for the qualifications of teachers of natural sciences in terms of learning a foreign language; recommendations on the observance of the conditions for the effective organization of teaching a foreign language; an expected learning outcome. The modeling of foreign language training is based directly on the practical professional orientation of foreign language training and should reflect all modern requirements imposed on graduates by the society, forms and means of foreign language vocational training, as well as the definition of its expected results. The authors of the article have clarified the main goal of foreign language vocational education, considered the requirements for foreign language orientation of qualifications of future biologists, justified the need and socializing potential of active forms of education.

*Keywords:* foreign language training, modeling, natural science direction, trilingual education, educational process, foreign language professional competence.

### *Introduction*

The implementation of trilingual education focused on integration into the world educational space, intercultural, informational and innovative development in Kazakhstan makes it necessary to revise the training of the future teacher. Since the 2019-2020 school year, at the choice of school, senior school pupils will begin to study subjects of the natural science cycle, namely Chemistry, Biology, Physics, and others in English, foreign language professional training is becoming the most important component of the professional training of a teacher of natural sciences and the result of personality development of the future specialist [1].

Use of English as a means of professional training is practiced in other countries, too. In Europe, the Middle East, Southeast Asia and Japan it is realized with the help of the CLIL approach (Content and Language Integrated Learning) [2; 389]. In North America this approach is known as Content Based Instruction (CBI). According to these approaches one of the conditions for language training is the parallel training of profile disciplines in English [3; 70]. Combining discipline and language is also widely used in the US in the approach known as «sheltered instruction» in all subject areas and at all levels [4; 4237].

The peculiarity of foreign language professional training of future teachers lies in the practical professional orientation of the formation of their foreign language communicative competence. This means that it is necessary to closely link English with a number of special disciplines.

N.D. Galskova studied the issue of using of a foreign language as an effective means of professional and social orientation of a student in a non-linguistic university, paying special attention to the establishment of a two-way connection between mastery by the student of special knowledge of the discipline and mastery of a foreign language [5; 4]. Now, when foreign language communication is becoming an integral component of the teacher's future professional activity, it becomes necessary to raise the level of practical knowledge of a foreign language so that future teachers are ready to teach in a foreign language, as well as to conduct foreign language communication in specific professional, business and scientific fields and situations taking into account characteristics of their professional thinking.

Thus, it is necessary to rethink aspects of foreign language learning and to simulate the modern process of foreign language education so that it provides a high level of foreign language professional competence [6; 394].

### Method

The research methodology is the study and analysis of psychological, pedagogical and methodical literature. The basis is taken in the works in the field of: modeling foreign language training (V.A. Burmistrova, N.A. Svich [7]; O.A. Kozyreva [8]; G.K. Kosmaganbetova [9]); the theory of professional and communicative orientation of the educational process in teaching foreign languages (R. Cross [2]; M.B. Ganachevskaya [6]; U.I. Kopzhasarova, N. Stanciu, A.S. Mustafina [10]; B.H. Kussanova, G.U. Utelbayeva, A.B. Zhuminova, K. Zhubanov [11]; L.Yu. Minakova, O.A. Obdalova [12]; S. Roussel, D. Joulia, A. Tricot, J. Sweller [3]; V.V. Safonova [13]; D.J. Short [4]; T.V. Sidorenko, O.M. Zamyatina [14]); methods of foreign language training (N.D. Galskova [5], N.I. Gez [15]; S.S. Kunanbayeva [16]; R.P. Milrud, I.R. Maximova [17]; Ye.I. Passov [18]; M.G. Yevdokimova [19]); development of pedagogical conditions for the organization of foreign language training for students of non-linguistic specialties (A.B. Mekezhanova, G.K. Tleuzhanova [1]).

The descriptive method, which includes the study of psychological, pedagogical, and methodological literature, modeling techniques, classification, and generalization, is fundamental to the research being undertaken.

### Results and Discussion

Occupying an important place along with such methods of scientific research as observation and experiment, **modeling** is a general scientific research method, the main purpose of which is to determine the essence of the object under study [16; 159]. The analysis of pedagogical and scientific methodical literature, the study of the work experience of foreign language teachers in non-linguistic universities have led to the conclusion that it is advisable to include the following components in the structure of pedagogical modeling of foreign language professional training:

- *target* — involves determining a block of goals and objectives of foreign language professional training;
- *content* — involves the selection of the content of educational material;
- *procedural* — provides the choice of methods, forms and means of training;
- *diagnostic and performance component* — describes the expected results of foreign language training, as well as associated with periodic control of the course of training and evaluation of its results [7].

We consider it expedient to start modeling of the teacher's foreign language professional competence with the identification of the specifics of his professional activity.

The goal of **foreign language professional training** of future specialists in higher education is the formation and development of such a level of foreign language competence that will allow the future specialist to successfully use a foreign language in the classroom, communicate in a foreign language in business, scientific and professional areas of communication [11; 53].

The content of foreign language teaching is based on the following components:

- the sphere of communicative activities, themes, situations and programs for their deployment, communicative and social roles, speech actions and speech material (texts, speech images, etc.);
- language material, the rules of its presentation and skills of operating with it;
- a complex of special (speech) skills that characterize the level of practical mastering a foreign language as a means of communication, including those in intercultural situations;
- a system of knowledge of national cultural features and realities of the country of the language being studied, a minimum of etiquette forms of speech and the ability to use them in various spheres of speech communication;
- educative and compensating (adaptive) skills, rational methods of mental work, providing a culture of learning the language in the educational environment and a culture of communication with native speakers [5].

To clarify the **content of foreign language professional training**, one should add to this list the sphere of professional activity, including topics and situations of professional communication, as well as professionally oriented speech material in the form of special terminology and skills to use it.

As for the **procedural component** of the pedagogical modeling of foreign language teaching, it is based on the technologies of communicative and competence-based learning. According to the communicative approach, the ultimate goal of foreign language training is the formation of students' communicative competence, namely, «the ability to adequately address the most diverse situations of communication

(by goal, by role relationships, by form, by content, etc.) receptive types of linguistic means and methods appropriate to any specific situation» [18; 28].

The competence model of the specialist, being the methodological basis for the development of state standards and training programs, is aimed at developing a number of key competences for the student, which are the professionally important qualities of the modern teacher of natural sciences, including the foreign language professional competence.

The competence model of training in the university contains the following competencies:

– *Professional competences*, which refer to theoretical and practical knowledge, skills, abilities and competencies in a particular subject area. Moreover, a modern professional activity is not limited to the development of skills related to a professional sphere, but also involves the development of global and critical thinking, possession of cognitive competence to understand the background knowledge and ideas of foreign partners in professional communication [19; 13].

– *General scientific competencies*: understanding, connections, knowledge, allowing to relate various factors with each other, assessing the role of individual components in the system, planning changes in the system and creating new systems [14; 141].

– *Instrumental competencies*: the ability to understand and use ideas and conclusions, environmental management, time management, building learning strategies, making decisions, computer skills, information management skills.

– *Interpersonal competences*: conscious expression and motivation of their attitude to something, ability to think critically and self-criticism, as well as social interaction and cooperation, ability to work in a group, take on social and ethical obligations [14; 141].

R.P. Milrud adds *subject competence* to this list, considering it an integral indicator of the organization of the process of foreign language training of specialists. It refers to «the realization of cognitive abilities, systematic knowledge assimilation, educational autonomy and effective interpersonal communication, participation in individual and group projects, periodic self-control and self-testing, ensuring sustainability and growth of learning results by one's own efforts» [17; 30].

– *Foreign language communicative competence*, implying practical knowledge of a foreign language, ensuring the achievement of communication goals for the purposes of communication [10; 36]. It does not only carry communicative and sociocultural value, but also suggests using English as an additional tool for gaining advantages in a competitive world [20; 488].

Let us dwell on foreign language communicative competence.

The main components of the foreign language competence of a bachelor of non-linguistic specialty are: knowledge component (knowledge of vocabulary, grammar and authentic use of a foreign language), formation of speaking, reading, listening, writing skills, use of language in extracurricular time (extensive reading by interests, searching for necessary information on the Internet, using translation of authentic scientific and popular science literature for participating in scientific conferences, assisting in the creation of didactic materials and teaching aids, etc.) [9; 105].

N.D. Galskova and N.I. Gez, in their turn, distinguish the following components of the foreign language communicative competence:

– linguistic (knowledge of the language system and formation of the skills of using language means of communication on their basis);

– pragmatic (knowledge and skills that allow to understand and create foreign language statements on a specific communicative situation, in accordance with the task and communicative intention);

– sociolinguistic (competences that allow to build verbal and non-verbal foreign language communication in accordance with the national cultural characteristics of the native speakers of a foreign language) [15; 21].

A broader list of competencies that make up the foreign language communicative competence is presented by the Council of Europe for cultural cooperation. We agree with the opinion of V.V. Safonova, who summarized a number of works devoted to this problem and highlighted the following components of the communicative competence:

– linguistic competence (proficiency in vocabulary, rules for constructing lexical units into meaningful utterances, ability to build grammatically correct forms and sentences, semantic segments of speech);

– sociolinguistic competence (the ability to use and organize language forms in accordance with the situation of communication, readiness of a person to an intercultural dialogue as a participant and mediator);

- discursive competence (the ability to construct and interpret individual statements in meaningful communicative models);
- sociocultural competence (familiarity with the national-cultural specifics of foreign language speech behavior relevant to the creation and understanding of speech from the point of view of native speakers);
- social competence (the ability to enter into a communicative act with a communication partner in accordance with the needs, motives, a certain attitude towards the communicator, as well as one's own self-esteem);
- strategic competence (the ability to compensate for the lack of language skills with special means, speech and social experience of communication in a foreign language environment) [13; 34].

Thus, analyzing the competences aimed at building the process of foreign language learning in accordance with the developed model, we should highlight: *foreign language communicative competences* (linguistic, sociolinguistic, discursive, sociocultural, social, strategic), *professional competences*, *general cultural competences* (instrumental, interpersonal, systemic) [8; 145].

Based on the above competencies, it is possible to formulate **tasks** specifying the goals of foreign language professional training for students of non-language faculties, as follows:

1. To develop appropriate competences in all types of foreign language activities (reading, listening, speaking, writing), which are the basis of linguistic (foreign language) competence.
2. To develop general cultural competences by acquiring knowledge about the culture of the country of a foreign language being studied and the development of skills and abilities to use the knowledge and ideas obtained in foreign language communication.
3. To form the professional competence of future specialists through a foreign language.
4. To develop competencies (linguistic, sociolinguistic, sociocultural, discursive, strategic) that facilitate the implementation of foreign language professional communication through foreign language professional content.
5. To develop the ability to self-study for a foreign language, as well as the ability to use foreign language teaching materials [21].
6. To establish a positive attitude (motivation) to learning a foreign language due to the practical use of the knowledge, skills, abilities and competencies gained [12; 145].

To realize the potential of a foreign language as an effective means of professional and social orientation in a non-linguistic university, in the opinion of N. D. Galskova, it is advisable to comply with the following **conditions**:

- a clear statement of the goals of foreign language speech activity;
- social and professional orientation of this activity;
- the satisfaction of students in solving particular problems;
- the formation of the students' ability to creatively approach the solution of private tasks;
- a favorable psychological climate in the educational group [5].

We can also add to this set of conditions the following:

- a combination of the competence (target component), information (methodological component) and personality-oriented (emotional component) approaches;
- comprehensive mastering of all components of communicative competence with an emphasis on sociocultural and discursive competence in the process of educational and professional foreign language communication that simulates professional situations;
- ensuring the integration of the foreign language with disciplines of general professional and a special block of disciplines;
- the creation of an information-competence environment conducive to the effectiveness of professional language training.

Since the foreign language discourse acts as a carrier of information and a unit of communication when teaching a foreign language, in the new socio-economic conditions for a foreign language course, the methodology of foreign language teaching of natural science students should be based on the specifics of the professional communication of this contingent of students with a bias in the ability to teach in a foreign language, the representation of scientific knowledge, the ability to work with information of a research nature, critically analyze the experimental data and create original products of the verbal and cognitive activity in English.

Let us consider the modern **requirements** for the qualifications of teachers of natural sciences.

According to the standard curriculum of the discipline «Professionally Oriented Foreign Language» for students of the specialty 5B011300 - Biology, as the results of studying a foreign language students **should know**: the basic forms of life, levels of biological organization and properties of biosystems, the genetic basis of individual development, general grammar in a biological context, rules speech etiquette in the professional sphere [22; 26].

Students **should be able to**: analyze and evaluate social information, plan and carry out activities, taking into account the results of the analysis; read and understand authentic articles on professional topics in order to general understanding of the content and search for the necessary information; express opinions on the issues discussed; understand oral authentic messages, conversations and interviews, work with dictionaries and reference books; translate, annotate and study texts; write business letters, prepare reviews and presentations [22; 26].

Also, students **should acquire**: a foreign language to the extent necessary to obtain professional information from foreign sources, as well as for oral and written communication with foreign partners, the skills of informal communication in English and translation of texts relating to professional activities [22; 26].

The linguistic component occupies an increasingly significant place in the teaching model of the modern teacher of natural sciences, being a means of preparing the latter for future pedagogical activity, international academic, scientific and professional cooperation. In the context of Kazakhstan's higher pedagogical education, foreign language training is laid within the framework of the program providing study of Foreign Language in the 1st year of study, as well as Professionally-Oriented Foreign Language in the 3rd year of study, which are part of the compulsory component disciplines cycle, as well as subjects of the elective component (for example, «Language for special purposes»). Nevertheless, the limited number of study hours (3 hours per week), lack of development of effective methods of foreign language teaching and the low level of students' motivation to learn a foreign language prove the need to revise the **procedural component** of modeling foreign language professional training of students in Kazakhstani pedagogical specialties [9; 105].

When choosing a training technology in the process of forming the above competencies, a maximum approximation of the educational process to the immediate professional activity or its imitation is required, which can be achieved if the optimum conditions for interaction between the participants of the study group, the individual position in relation to the problem are observed, discussion and evaluation professional character, which is typical for the realities of professional activity. Pay attention to the use of **active group forms**, for example:

– *the method of developing cooperation*, which is characterized by the formulation of tasks that are difficult to accomplish individually, requiring the distribution of work in a group, the cooperation of students' efforts;

– *the project method* as a set of educational and cognitive techniques that allow to solve problems as a result of independent actions of students with the mandatory presentation of the results of activities;

– *business game*, which helps to approach the situation of real communication, imitation of the roles of professional activity, etc. [12; 146].

As for the **diagnostic and performance component**, the expected result of foreign language professional training of students of pedagogical specialties is the formation of a foreign language professional competence, manifested in accordance with the statement given to the topic of professional communication; the number of phrases based on the models of the language being studied; variety of models; phonetic and grammatical correctness of speech; the ability to keep up the conversation.

### *Conclusions*

The integration of professional and foreign language training at university contributes to the successful socialization of graduates, contributes to their entry into the world of human culture.

A necessary condition for the development of an effective foreign language professional training program is the use of communicative and competence-based approaches, since their methodological basis provides the teacher with the opportunity to fill the educational process with value-semantic and personality-oriented content, to build a learning process that promotes the development of socially significant competencies, realizes the communicative orientation of learning, reveals creative potential of students, raises tolerance in the process of intercultural interaction.

The socializing potential of active forms of education is important, since their use contributes to the formation of both common communication skills and effective interaction skills to solve problems in the

field of professional communication, as well as awareness of the need to learn a foreign language and increase motivation to learn it.

Today training of students of natural sciences in the field of foreign language training should reflect all modern requirements imposed on graduates by society, it is focused on the formation of highly qualified specialists in professional activities and professional and foreign language communication. Based on the analysis of the standard program of the discipline «Professionally Oriented Foreign Language» for students of the specialty 5B011300 - Biology and the work of teachers, we have figured out that the main goal of higher education is to master a foreign language as a means of free communication at the professional and business level, as well improvement of knowledge of a foreign language in the process of professional activity and, on the contrary, the acquisition of new knowledge in the specialty and increase of professional skills asterism through the use of a foreign language.

The modeling of foreign language professional training of future teachers in the natural science direction is of great interest on the part of researchers and practitioners, since it involves revising and clarifying goals and objectives, content, methods, forms and means of foreign language vocational training, as well as determining its expected results.

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Г.К. Тлеужанова, Н. Станчу, А.Б. Мекежанова

## Жаратылыстану ғылыми бағыты студенттерінің тілдік дайындығын үлгілеу

Мақала биолог-студенттерін шет тілінде даярлаудың үлгілеу компоненттерін анықтауға арналған. Қазіргі уақытта бұл тақырып өте өзекті, себебі жаһандану жағдайында осы заманның мамандарына шет тілін игеру қажетті болып табылады және студенттерде шет тілде кәсіби құзыреттілікті қалыптастыруды көздейді. Шет тілді кәсіби даярлықты модельдеу мақсат, міндеті мен шет тілінде кәсіби даярлаудың мазмұнын; шет тілде оқытудың педагогикалық модельдеу процедурасының компонентін талдауды; шет тілін оқыту тұрғысынан жаратылыстану ғылымдары оқытушыларының біліктілігіне қойылатын талаптарды; шет тілін оқытуды тиімді ұйымдастыру шарттарын сақтау бойынша ұсыныстарды; оқытудың күтілетін нәтижесін қамтиды. Шет тілде даярлықты модельдеу шет тілді оқытудың практикалық кәсіби бағытына негізделген, түлектердің барлық заманауи талаптарына сәйкес болуы, кәсіби қызметте және кәсіби-шет тілді коммуникацияларда жоғары білікті мамандарды қалыптастыруға бағытталған, бұл өзге тілді кәсіби оқытудың мақсаттары мен міндеттерін, мазмұнын, әдістерін, нысандары мен құралдарын қайта қарау мен нақтылауды, сондай-ақ оның күтілетін нәтижелерін анықтауды көздейді. Авторлар шет тілде кәсіби білім берудің негізгі мақсатын нақтылап, шет тіліне бағытталған болашақ биологтардың біліктілігіне қойылатын талаптарды қарастырады, белсенді оқыту формасының әлеуметтендіруші әлеуетінің қажеттілігі негізделген.

*Кілт сөздер:* тілдік дайындық, модельдеу, жаратылыстану ғылыми бағыты, үш тілде білім беру, білім беру процесі, шет тілді кәсіби құзыреттілік.

Г.К. Тлеужанова, Н. Станчу, А.Б. Мекежанова

## Моделирование языковой подготовки студентов естественнонаучного направления

Статья посвящена выявлению компонентов моделирования иноязычной подготовки студентов-биологов. В настоящее время данная тема особенно актуальна, поскольку владение иностранным языком современными специалистами является необходимостью в условиях глобализации и предусматривает формирование у студентов иноязычной профессиональной компетенции. Моделирование иноязычной профессиональной подготовки включает цель, задачу и содержание профессиональной подготовки иностранного языка; анализ процедурного компонента педагогического моделирования обучения иностранному языку; требования к квалификации преподавателей естественных наук с точки зрения обучения иностранному языку; рекомендации по соблюдению условий эффективной организации обучения иностранному языку; ожидаемый результат обучения. Моделирование иноязычной подготовки основывается непосредственно на практической профессиональной направленности иноязычного обучения. Иноязычная подготовка должна отражать все современные требования, предъявляемые обществом к выпускникам, ориентирована на формирование высококвалифицированных специалистов в профессиональной деятельности и профессионально-иноязычных коммуникациях, что предполагает пересмотр и уточнение целей и задач, содержания, методов, форм и средств иноязычного профессионального обучения, а также определение его ожидаемых результатов. Авторами статьи была уточнена основная цель иноязычного профессионального образования, рассмотрены требования к иноязычной направленности квалификации будущих биологов, обоснована необходимость и социализирующий потенциал активных форм обучения.

*Ключевые слова:* языковая подготовка, моделирование, естественнонаучное направление, трехязычное образование, образовательный процесс, иноязычная профессиональная компетенция.

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