

**IFTE 2017**  
**III International Forum on Teacher Education**

**INNOVATIVE TEACHER TRAINING: PEDAGOGICAL  
CONDITIONS OF TRAINING TECHNOLOGIES FOR EARLY  
PROFESSIONAL SELF-DETERMINATION**

S.I. Gilmanshina (a)\*, G.F. Melnikova (b), G.R. Ereemeeva (c)  
\*Corresponding author

(a) Kazan (Volga region) Federal University, 18, Kremlyovskaya str., Kazan, 420008, Kazan, Russia,  
gilmanshina@yandex.ru, +79272409728

(b) Kazan (Volga region) Federal University, 18, Kremlyovskaya str., Kazan, 420008, Kazan, Russia,  
ms.valitova1989@mail.ru, +79196809590

(c) Kazan (Volga region) Federal University, 18, Kremlyovskaya str., Kazan, 420008, Kazan, Russia,  
guzeliksanova@rambler.ru, +79178842569

***Abstract***

At the present stage of transformation of education, the role of an innovative teacher possessing modern teaching methodology and capable to prepare schoolchildren for an informed choice of future profession, is growing. In this regard, it is necessary to teach future teachers the technologies of early professional self-determination of schoolchildren at universities. The aim of the research is to develop pedagogical conditions for teaching students of pedagogical departments the technologies of early professional self-determination of schoolchildren in the university system of a new type of teacher training. The leading approach of the research is the system-activity approach, which assumes that the development of the student's personality takes place on the basis of systemic learning activity. The article presents the developed methodological component of the distributed model of training new subject teachers in specialized institutes of the federal university. The emphasis is laid on career-oriented project activity of future teachers of natural science disciplines in the methodical system of a new type of teacher training. Pedagogical conditions of teaching students the technologies of early professional self-determination of schoolchildren are revealed in the system of university of novel of teacher training.

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**Keywords:** Education, professional development, teachers, gifted teenagers.



## **1. Introduction**

Nowadays pedagogical education cannot be viewed in isolation from fundamental changes in society and the economy. Political changes in the international community also dictate their requirements for novel teacher training and formation of students perceived motivation for pedagogical activity. A lot has been done at the federal level to popularize teacher education. These are experiential in various specialized programs: All-Russian competition "Teacher of the Year", and grants and scholarship programs for students of pedagogical departments. However, the issue of early professional self-determination of schoolchildren for the profession of a teacher is very relevant and requires the organization of targeted systematic career guidance throughout the entire period of schooling, starting with primary school.

Moreover, at the present stage of transformation of education (Gilmanshina, Khalikova, 2016; Gilmanshina, Sagitova, Gilmanshin, 2016), the role of an innovative teacher possessing modern teaching methodology and capable to prepare schoolchildren for a deliberate choice of the future profession, is growing. In this regard, taking into consideration the society's need for new technologies (Gilmanshin, Ferenets et al., 2015), it is necessary to teach students of pedagogical departments of universities the technologies of early professional orientation of schoolchildren for engineering specialties (Gilmanshin, Gilmanshina, 2016).

## **2. Problem Statement**

The analysis of various methods and techniques of career guidance (Popov, 2011; Rakhina, 2015 and many others) reveals that methodically well-developed career-oriented classes in the early grades contribute to the formation of ideas about professions in the minds of the students, they teach careful attitude to the results of labour and understanding of the importance of the work of professionals in the development of society. However, if for high school students there are many methodological developments using a variety of career guidance methods and techniques (methodology of project-based learning (Gilmanshina, Gilmanshin, 2015), integrated methods (Sibgatova et al., 2015) and many others), then for students at junior level such developments are clearly insufficient. Moreover, there are very few scientific works devoted to training students – future teachers the technologies of early professional self-determination of schoolchildren. Although it is clear that in the process of developing of pedagogical conditions of teaching students these technologies it is necessary to rely on the scientific view on the activities of the teacher (Zimnyaya, 1997; Gilmanshina, Sagitova et al., 2015; Gilmanshina, Gilmanshin et al., 2016) and professional personality development (Klimov, 2004; Samigullina et al., Gilmanshina et al., 2015).

## **3. Research Questions**

What are the pedagogical conditions for teaching students of pedagogical departments the technologies of schoolchildren early professional orientation in the system of University teacher of a new type training?

#### **4. Purpose of the Study**

To develop pedagogical conditions of training future teachers the technologies of early professional self-determination of schoolchildren in the system of University teacher of a new type training.

#### **5. Research Methods**

The leading approach of the research is the system-activity approach, which implies that the development of the student's personality is based on systematic learning activities. Today, it is important to create and organize conditions that trigger the student's action. The system-activity approach, in its turn, is connected with the modern stage of the development of society and education. The main task of modern education is to form the personality of the student, who is able and willing to learn all his life, to work with a team of professionals, to be good at self-development and professional self-determination.

The concept of the system-activity approach appeared as a result of the combination of the system and activity approaches. The system approach requires consistency in education and formation of personality, while the activity approach proves the uselessness of knowledge and skills which are not implemented in productive activities. The basic position of the activity approach is due to the fact that psychological abilities of a person are the result of the conversion of external objective activities into internal mental activities through successive changes. The development of a personality is determined primarily by the nature of organization of their academic and extracurricular activities. The activity approach is well combined with modern educational technologies, such as information and communication technologies, project activities and problem-based learning.

In general, the system-activity approach implies the following:

- education and development of personal qualities that meet the requirements of modern information society;
- transition to the strategy of social design and engineering;
- orientation to the educational standard of a new generation;
- recognition of the critical role of the content of education and ways of organizing educational activities and educational cooperation to develop students;
- considering individual age, psychological and physiological characteristics of students;
- ensuring the continuity of preschool, primary general, basic and secondary general education;
- a variety of individual educational trajectories and individual development of each student (including gifted children and children with disabilities), which ensure the growth of creative potential, cognitive motives, enrichment of forms of educational cooperation, and expansion of the zone of proximal development.

## 6. Findings

### 6.1. The system of methodical training of a novel chemistry teacher at the Federal University

At Kazan (Volga region) Federal University, an innovative distributed model of a specific subject of innovative teacher training at specialized institutions has been implemented since 2011. For example, chemistry teachers are respectively trained at the Chemical Institute named after Butlerov.

During in the process of teaching chemistry, schoolchildren are not only provided with comprehensive development, but also developed creative qualities, methodological preparation of students at the university is regarded as an integral part of the overall pedagogical preparation of a future innovative teacher. The methodical preparation of students for teaching chemistry includes, the classical methodological discipline “Theory and methodology of teaching chemistry” along with the new courses, such as “Variability of chemical education”, “Peculiarities of teaching chemistry in rural schools”, “Education system of Tatarstan” and others.

Let us take a closer look at the discipline “Education system of Tatarstan”, which is studied in the seventh semester of the 4th year, according to the curriculum “Pedagogical Education, Profile Chemistry”. By this time, students are completing the course “Theory and methodology of teaching chemistry” and pedagogical practice (both concentrated and distributed) in basic schools and partner schools.

During the course “Education System of Tatarstan” students - future teachers get acquainted with the system of professional development of teachers of the Republic of Tatarstan, develop lessons on the most difficult topics in the school course for the students. In addition, students demonstrate fragments of lessons to teachers-participants of advanced training courses.

In general, the methodical preparation of students in the course of studying consists of four stages. At the first stage, the most complex topics of the school chemistry course are identified. To this end, the teachers of chemistry-participants of advanced training courses at Kazan Federal University were offered questionnaires to indicate topics, which they would like to receive consultations for and carry out laboratory work. The survey revealed the following topics: “Qualitative elemental analysis of organic compounds”, “Methods for purification of substances”, “Superficial phenomena”, “Colloid-dispersed systems in the environment”, “Optical properties of organic substances”, “Chemistry and production” and others.

At the second stage, students develop laboratory work using modern equipment on the above topics, under the guidance of the teacher.

At the third stage, students demonstrate the laboratory work to teachers with the discussion procedures. As an example, we give the description of the lab work on “Qualitative elemental analysis of organic compounds”, developed by students for teachers training courses. The purpose of this laboratory work is a practical acquaintance with the methods of qualitative elemental analysis of organic compounds. The task is to determine the halogen content of the organic substance by putting copper wire preliminarily moistened with a halogen-containing organic substance into the burner flame. This experience requires a minimum of equipment and reagents. Sufficient copper wire, tweezers, gas burner, hydrochloric acid HCl solution, iodoform crystals CHI<sub>3</sub> (or chloroform CHCl<sub>3</sub> solution) are enough. Let

us briefly describe the progress of the work. You need to take copper wire with a loop at the end. The end of the wire is calcined in a colourless flame of the burner until the flame colouration ceases and a black deposit of copper oxide (II) forms on the surface. A few grains of the iodoform (or moistened with chloroform) are gained with the help of the cooled air loop, and then again are put into the flame of the gas burner. For cleaning, the wire is moistened with hydrochloric acid and calcined. At the end of the experiment, it is necessary to write down the equations of chemical reactions, observations, and conclusion.

At the fourth stage, students develop and demonstrate non-standard lessons for the teachers. For example, in 2016/2017 academic year at the Department of Chemical Education at the Chemical Institute named after Butlerov, a joint practical of the fourth-year students of the specialization “Pedagogical Education, Profile Chemistry” and chemistry teachers-participants of advanced training courses under the program “Formation of the developing educational environment on the subject of “Chemistry” in the context of a phased introduction of a new State Educational Standard” was held. There were teachers of chemistry of the highest and first qualification categories from the educational institutions of the cities of Kazan, Almetyevsk, Bugulma, Leninogorsk, Nurlat, Tyulyachinsky, Sabinsky, Alekseevsky, Pestrechinsky and other municipal districts of the Republic of Tatarstan. Students under the guidance of the teacher developed and demonstrated a non-standard chemistry lesson for the profile training on the topic “Amino acids” in the form of a pedagogical studio (workshop, French technology, art studio). Students were participants of advanced training courses. They interactively “passed through” all the stages of the lesson-induction, self-and social construction, socialization, publicity, rupture, reflection, working in a team, defending projects and conducting chemical experiments. In conclusion, the teachers and students exchanged views on the effective organization of the teaching and educational process in chemistry in the context of the introduction of the Russian educational standard of the new generation.

Thus, the methodical training of future innovative teachers of chemistry at the Department of Chemical Education of Kazan Federal University is closely connected with joint activities and cooperation with present experienced teachers. On one hand, this allows students to conduct approbation and analysis of various methods of teaching chemistry in an interactive mode, on the other hand, it significantly improves the quality of teaching chemistry at school.

## **6.2. Profession-oriented project activities of future teachers of natural-science disciplines in the system of methodical innovative teacher training**

The interactive projects of future teachers of chemistry and biology, carried out during the period of pedagogical practice in schools, contribute to professional self-determination and the increase of interest in natural sciences (for example, in-depth study of chemistry) and the development of students' creative qualities. First, in small groups students had developed a methodology for conducting profession-oriented activities for schoolchildren. Then they presented the development for the educational and methodical competition of the department of chemical education “Festival of Chemistry”. These are projects such as “Journey to the World of Chemistry”, “Country of Unlearned Chemical Formulas”, “Chemical Multi-Storied Building” and many others. During the projects' evaluation, the optimal combination of teaching and entertaining experiences was considered, the science of explaining the

essence of the chemical phenomenon, and the quality of the questions asked by the audience. The duration of the project lasted 30-40 minutes.

A new direction in the project activity of students in developing the interest of adolescents in natural sciences - chemical shows in an interactive mode - was formed in 2016, during mass profession-oriented activities conducted by students and teachers of Kazan Federal University. While preparing for the chemical show, the technique of carrying out the chemical demonstration experiment was carefully studied, considering the safety techniques and communication interaction with the audience.

### **6.3. Development of pedagogical conditions for teaching students the technologies of early professional self-determination of schoolchildren in the system of innovative University teachers training**

The conducted researches made it possible to distinguish four pedagogical conditions for teaching future teachers the technologies of early professional guidance of schoolchildren.

The first condition is the development of courses of methodical disciplines aimed at forming the students' readiness to apply the technologies of early professional self-determination in pedagogical activity. For this purpose, new disciplines are included in the curriculum for novel teacher training in the direction "Pedagogical Education, Profile Chemistry" in addition to the traditional methodological disciplines "Theory of Chemistry Teaching" (year 1) and "The Chemistry Technique" (years 2, 3): "Innovations in chemistry education" (years 1, 3), "Didactic games in the teaching of chemistry" (year 1), "The System of Education in Tatarstan" (year 4), and the material of which allows to acquaint students with modern technologies of career guidance.

The second condition is the development of interactive projects by students group for primary and secondary school pupils expanding their understanding of the world of professions. Its essence is that, pupils begin to form their verbal-logical thinking, handle words, understand the logic of judgments and be able to argue their own point of view since the beginning of schooling, all profession-oriented projects should imply the interactivity and logical explanation of the demonstrated phenomena and processes. Of course, the age characteristics of primary school students have some differences, in comparison, with pupils of grades 8-11. For example, long stories, conversations about professions are not effective. When developing projects, it is necessary to take into consideration the cognitive interests of primary school students (what they are really interested in): to play, listen and discuss fairy tales, draw, solve puzzles and riddles and the like.

The third condition is holding annual scientific conferences for students of pedagogical departments, for example, in the section "Chemical Education", and educational and methodical competitions, such as the "Festival of Chemistry" and others.

The fourth condition is the practical testing of profession-oriented projects in communication with children and adolescents. For example, 2<sup>nd</sup> - 4<sup>th</sup> year students developed and tested a number of projects on early professional self-determination. So, in the Children's City of professions "KidSpace" (Kazan), interactive chemical expositions for children of the 1st and 2nd grades were realized, in the Technical Creativity Houses for Children and Youth (Kazan, Ulyanovsk) - interactive classes for pupils of grades 3-4, in the museum of Kazan chemical school – profession-oriented projects for students of grades 5-6,

during pedagogical practice in basic schools - extra-curricular profession-oriented activities for pupils of grades 8-11.

## 7. Conclusion

The pedagogical conditions for teaching future teachers the technologies of early professional self-determination of schoolchildren in the system of innovative university teachers training are theoretically grounded and experimentally tested. This is the development of courses and methodical disciplines aimed at forming the future teachers' readiness to apply technologies of early professional self-determination of schoolchildren; the development of group interactive projects for elementary, basic and secondary schools, expanding their perception of the world of professions; conduction of scientific-methodical conferences and educational-methodical competitions for students of pedagogical departments; and practical approbation of profession-oriented projects in communication with children and adolescents.

## Acknowledgments

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

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