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TÍTULO: Tradiciones e innovaciones en la formación de ingenieros energética en el territorio de la República de Tatarstán.

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RESUMEN: El artículo describe la experiencia de las universidades en la capacitación de ingenieros-estudiantes y especialistas de ingeniería energética en Tatarstán involucrados en los programas de capacitación avanzada del personal. Utilizamos métodos como análisis de literatura científica y metodológica, planes de estudio, programas de trabajo, materiales de medios de comunicación, recursos de Internet, estudio, y resumen de las mejores prácticas de sus tradiciones e innovaciones. Los resultados de la investigación y su interpretación pueden ayudar a investigadores novatos, científicos nacionales y extranjeros a elaborar ideas generales sobre el sistema de capacitación de ingenieros y especialistas en ingeniería energética en el territorio de la República de Tatarstán. Damos una descripción de los principales enfoques y resultados prácticos en la actividad de los estudiantes en las áreas de energía de sus futuras especialidades.

PALABRAS CLAVES: especialista en ingeniería energética, actividad del alumno, áreas de energía.

TITLE: Traditions and innovations in Training Power Engineers on the territory of the Republic of Tatarstan.

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ABSTRACT: The article describes the experience of universities in training power engineers-students in Tatarstan and specialists involved in the personnel advanced training programs. We used methods as analysis of scientific and methodological literature, curricula, work programs, mass media materials, Internet resources, studying, summarizing the best practices of its traditions and innovations. The research results and their interpretation can help novice researchers, domestic and foreign scientists to draw up the general ideas about the system of training power engineers-specialists in the territory of the Republic of Tatarstan. We also give a description of the main approaches, practical results in the students' activity in the energy areas of their future specialties.

KEY WORDS: specialist in power engineering; student's activity; energy areas

INTRODUCTION.

In recent years, Tatarstan has shown high results of its development in the economic, scientific, technical and social spheres. It is significantly improved the indicators of interaction with various regions of Russia in trade, industry, agriculture, transport, as well as it is strengthened the relations with foreign countries in the field of education, system of professional training, power engineering, where the traditions and innovations play a decisive role.

This fact has been little studied by the domestic and foreign researchers, which represents a certain gap in knowledge relating to such areas as power engineering, system of higher education, additional education, and personnel advanced training experience for the vocational education institutions.

The largest higher educational institution in the Volga region - Kazan State Power Engineering University (KGEU) - trains the power engineers in the center of Kazan for many years. Its teachers rightly believe that there are three main professions in the world, without which the human existence is impossible. They include: doctor, teacher, power engineer. And, neither doctors, nor teachers, nor other specialists will not be able to work without power engineers, their qualitative self-giving.

The KGEU includes: Institute of Electric Power Engineering, Electronics, Institute of Heat Power Engineering, Institute of Economics, Information Technologies and others, in which the specialists of a broader profile in the power engineering field are trained. The quality of fundamental researches is carried out in close cooperation and competitive struggle with specialists of the Kazan National Research Technical University named after A.N. Tupolev (KNITU-KAI) and the Kazan (Volga) Federal University [K(P)FU]. Thus, the tasks of the KNITU-KAI include the orientation "on staffing THE priority areas for the development of science, technology, introduction of high technologies". An analysis of its work shows that the power engineering component is determined by the name of the institutes located in different corners of Tatarstan, the personnel training needs, which are being prepared at the Power Engineering Institute, the Institute of Computer Technologies, Information Protection and others. And, such training areas as: aircraft building, heat power engineering, heat engineering, computer science and computer engineering have the greatest demand out of 75 curricula of the KNITU-KAI.

In recent years, one of their multidisciplinary institutions among the universities of the Republic of Tatarstan, which is engaged in training the specialists in science-intensive areas, including the power engineering and information technologies, is becoming the K(P)FU.

DEVELOPMENT.

Materials and methods.

As is known, a scientific methodology is used as a curricula content component of any of the state universities. It is based on the best traditions of domestic and foreign researches on the formation of a creative, self-developing personality in the context of strengthening the market relations in Russia and beyond. This is the basis for developing a variety of teaching methods, involving students, young scientists, students of technical lyceums, gifted schoolchildren in the various types of scientific researches on energy, intellectual, automated control systems, engineering development, and personnel training for the secondary vocational education (SVE) institutions.

The work analysis of the higher educational institutions of the Republic of Tajikistan on training personnel in the field of power engineering shows that it includes a skillful combination of traditional and innovative approaches in the study of fundamental knowledge in physics, mathematics, computer science, and power engineering.

Particular attention is paid to the study of the operation of electrical machines, protective equipment, electric power control, the activities of generating, grid electric companies, information centers and technological processes. Moreover, the learning process encompasses both adults and high school students, secondary vocational education (SVE). Therefore, there are organized technical lyceums at the higher educational institutions, classes of technical creativity on the basis of summer health camps and technoparks. This tendency is particularly pronounced in the activity of the K(P)FU.

According to the legal documents, the K(P)FU includes the natural-technical, engineering, humanitarian institutes, as well as a number of specialized, multi-profile departments. It includes 150 scientific research laboratories, and the work geography covers both the capital of Tatarstan - Kazan - and the educational institutions (branches) in the cities of Chistopol, Naberezhnye Chelny and Elabuga.

There are 17 institutes and higher schools, 3 independent faculties, 1 general university department of physical education and sport, 2 specialized lyceums (including the IT boarding school of the KFU and the lyceum named after N.I. Lobachevsky) for gifted schoolchildren, as well as the Volga Center for Advanced Training, Vocational Retraining of Educators on the electronic site of the K(P)FU, Kazan.

At first glance, there are no specialized institutions, faculties, departments of power engineering profile with the K(P)FU. In fact, the system of training the power engineers (bachelors, masters, other professionals) is very diverse. It is solved at the faculties of the Institute of Mathematics and Mechanics, the Institute of Physics, the Engineering Institute, the Institute of Psychology and Education, the Institute of Continuing Education, the activities of branches.

One of the branches of the K(P)FU conducts its work in Chistopol, where it has been established on the basis of the Kama State Engineering and Economic Academy in April 2012. The main task of this university is the preparation of highly qualified, competitive, erudite human resources, with are trained by 14 Doctors and 30 Candidates of Sciences.

To prepare the "innovative-oriented" personnel, to develop the applied researches, to product the new types of products, it was opened the Engineering Center (ITS KFU) won the basis of the Naberezhnye Chelny Institute of the K(P)FU, where it was established 9 scientific and 11 educational scientific laboratories in February 2014.

The specialized lecture rooms, offices equipped with the modern multimedia are successfully working to receive the higher and additional education. There is formed and placed the methodical center for engineering training, the conference room of the Academic Council, defense of dissertational researches, meetings, conferences, master classes, and public lectures.

In order to improve the qualification, the specialists of the ITS conduct a variety of activities involving the experienced employees of various enterprises and institutions of the Republic of Tatarstan, which consider the issues of saving production, energy facilities and productions demanded in the region.

Another branch of the K(P)FU was established on the basis of the Pedagogical Institute in Elabuga in 2011. The institute itself has been functioning successfully since the beginning of the 50s of the XX century as a pedagogical university, now the Elabuga Institute of the Kazan Federal University (EI KFU), which has an accumulated rich experience of training teachers, in particular, teachers of physics, mathematics, computer science and energy.

For the implementation of this work, there are 7 faculties, 20 different departments, 4 scientific and training centers, 7 laboratories, a reading hall, a scientific library, several dozens of the specialized educational rooms equipped with the modern technology for organizing teaching and educational work with the students of various ages in the EI KFU.

The power engineers are trained here by teachers of the Faculty of Mathematics and Natural Sciences, the Faculty of Engineering and Technology, the Departments of Physics, General Engineering Training, Mathematics, Applied Informatics and others. It was established a testing center to work with the foreign students.

A lot of work is done with the schoolchildren, gifted children as future applicants on the basis of educational and scientific laboratories, for example, in computer modeling, in "Children

University", camp "Intelleto", "Summer Physics and Mathematics School" at the student camp "Burevestnik".

Results and discussion.

Of course, there is no longer enough of the traditional experience accumulated in the activities of each of the educational institutions to give the modern characteristics of the work of the K(P)FU and other universities. The innovative ideas and new technologies are actively introduced in them, covering the activities of structural subdivisions, the use of technical, laboratory equipment, the renewal of educational, research and scientific, teaching and student life.

In Tatarstan, its structure is most noticeable through the activities of a scientific-production, educational cluster, where the K(P)FU plays its the most important role. The essence of such transformations is the most complete reflection of the requests of individual, private business and the state, the purpose of which is not only to prepare the future power engineers and scientists for a given period of time, but to orient the university graduates to solving the pressing problems of society for several decades ahead (Yingprayoon et al., 2014; Samedov et al., 2015).

We also take into account the fact of Russian reality, supported by the K(P)FU, that all the higher educational institutions, including universities, institutes, energy and humanitarian academies are located in the cities not only of the republican but of municipal significance as well. Consequently, the problem of training the qualified personnel has a complex, regional, research and scientific, practical-oriented nature, reflecting the creative needs of an individual. At the same time, a technical, natural and scientific, humanitarian, practical component should be combined with deep knowledge, skills, competencies in the production field, experience in the scientific, economic, social sphere, interaction with the specialists from a number of countries and nations; that is why, the issues of teaching physical, mathematical, technical, humanitarian, energy disciplines are intertwined. This is reflected in the example of teaching Russian history, philosophy, professional

pedagogy, social psychology, Russian language, foreign languages in the activities of the universities. We revealed the same trend in the foreign literature (Europe, 2009; Canning, 2015; Ruthven, 2002; Goleman, 2005; Kaptan & Timurlenk, 2012).

The importance of this work in the EI K(P)FU is expressed in the special attention of teachers to the students as future power engineers with Bachelor's degree, computer technologists as accomplices of various types of creative classes (lectures, seminars, workshops), other types of works, involving people of different age groups (children, specialists, pensioners), conducting scientific and research, as well as laboratory works.

One of these areas is attracting the students of the EI KFU to participate in the projects of the special economic area "Alabuga" (SEZ), which is one of 4 of the best of 26 established ones throughout the Russian Federation for 11 years of their existence. In addition to the energy component, young people get acquainted with the developed infrastructure, which includes: production, power facilities, modern roads, enterprises that produce high-tech products.

The activity of the SEZ "Alabuga" is the territory of cooperation between universities, major joint-stock companies, enterprises. The employees of Nizhnekamsk HPP, RDE and the SC "KamAZ" JSC, as well as the university specialists take an active part in their work.

There are also implemented the new technological projects, there is a need for personnel, new jobs, domestic, foreign specialists, residents of a number of countries of the world, for whom the various tax preferences are established. They include the innovative project "Alabed" for the construction of 2 bridges across the Kama, garbage processing plant, and other enterprises whose goal is the development of the Kamsky energy cluster, the creation of a single labor market and the educational technologies.

The main directions in the study of educational resources include: "Power Electronics", "Circuit Engineering", "General Power Engineering" and others, the introduction of scientific discoveries, developments, with the participation of undergraduate students, masters, associated with the energy status of the society.

Another activity area of the K(P) is the strengthening of interest in physics, mathematics, astronomy and computer science in the system of school, professional, higher education as the basis for obtaining the specialties in power engineering. This captures not only Russian, but also the foreign students. Here, the interests of modern students extend from the special economic area "Alabuga" to the territories of advanced development (TAD), technoparks - the modern production and energy clusters of Tatarstan and the whole of Russia.

One of these TADs successfully works in Tukaevsky region, on the industrial site of Naberezhnye Chelny, where the most demanded products are produced at the most powerful technological base with the involvement of domestic and foreign investments.

To solve the requests of enterprises for the training of professionally oriented personnel, it is involved not only the mature population, student youth, but also the students of senior, specialized classes with the mediation of the city's social services. The centers of such work include children, students, youth associations, technical circles, technoparks or "Quantoriums".

One of such technoparks is located in Naberezhnye Chelny, and teachers of the educational institutions, universities of Tatarstan, in particular the ITS KFU, natural-mathematical, engineering-technological faculties of the EI KFU, support business and occupational contacts with its employees and students.

Naturally, this is facilitated by the developed infrastructure of the educational, power engineering complex of the Kamsko-Vyatka region, the availability of experienced teachers, teachers of

additional education, reserves of its development, as it is planned to open 17 more technoparks of different profiles in addition to the 24th operating ones in the territory of the Russian Federation.

CONCLUSIONS.

Proceeding from the above-mentioned provisions, relying on the opinion of scientists, teachers, workers in the power engineering industries of Tatarstan, the development of any problem should begin with a study of its history, accounting for the accumulated knowledge and problems.

It is important to deeply understand the essence of political, technological, power engineering and innovative processes occurring on the Earth, which gives an opportunity for the in-depth analysis of the energy status of each of the regions in the country, industrial, technological sector, farming, and home ownership.

It is necessary to take into account that the social and power engineering structure of society is also constantly improving, that is why it is necessary to carry out a critical review of the best domestic and foreign experience, its study, the introduction of new educational and information technologies accumulated in the power engineering centers, enterprises, educational institutions, for example, in a university.

Since the purpose, tasks, forms, methods, means, functions, results of the university activity are always unique in their content, then its analysis is always multifaceted.

This is facilitated by the personal-oriented nature of the teaching work, the specifics of the university administration in working with young people, their technical and material equipment, which makes it possible to concretize the curricula, training programs for specialists, and clarify the nature of organization of the scientific research, production and social pedagogical practice.

The relevance of the above transformations is typical not only for Tatarstan, but for all the subjects of Russia. As our study showed, this is due to a number of positions related to the formation of production and educational clusters, TADs, technoparks in Tatarstan, in which the K(P)FU plays its

leading role. This is especially important in working with students, future Bachelors, Masters, candidates, doctors of science, which, in part, is reflected in a number of scientific studies.

Another component is an increase in the role of universities of the Republic of Tatarstan, the entire education system of the country. To solve it, it is important to target teachers to the graduate's personality, which guarantees the depth and strength of their knowledge, and the practice-oriented, scientific and technological experience should become a guide for the work of teachers of all other educational institutions in the region, schools and out-of-school institutions. The fact that the graduates of the universities of the Republic of Tatarstan on the "power engineering" specialty will always easily adapt to working conditions in different regions of Russia is the key to success.

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