МРНТИ 14.35 **УДК** 378

DOI 10.58319/26170493_2024_1_42

INSTITUTIONAL ASPECTS OF HIGHER EDUCATION QUALITY ASSURANCE: A SOCIO-ECONOMIC VIEW

***PAK YU.N.**¹ Doctor of Technical Sciences, Professor

NURGUZHINA G.M.²

Candidate of Pedagogical Science, Associate Professor ²G. Daukeyev Almaty University of Power Engineering and Communication NJSC, Almaty, Republic of Kazakhstan

PAK D.YU.¹

Candidate of Technical Sciences, Associate Professor

TEBAYEVA A.YU.¹

Master

¹A. Saginov Karaganda Technical University, Karaganda, Republic of Kazakhstan

ABSTRACT. Institutional aspects of higher education quality assurance have been considered. The controversial aspects of the integration of the Kazakh higher education system into a single educational space have been studied. The factors hindering the innovative development of higher education have been analyzed. The features of the National Education Quality Assessment System, including procedures for input, intermediate and output control, have been considered. The expanding mass character of higher education and its accessibility exacerbate the problem of quality assurance as the most important competitive advantage of a university. Recommendations have been given for developing the culture of quality education, improving the National Qualifications System, increasing the effectiveness of the university-employer social partnership in the development of practice-oriented programs in the format of a competency-based approach. The need to increase budget funding for higher education and to improve the social status of university teachers has been emphasized, which will have a positive impact on the growth of economic indicators.

KEYWORDS: globalization and mass character of higher education, ensuring the quality of education, professional and educational standards, social partnership between university and employer, competency-based model, economic growth.

ЖОҒАРЫ БІЛІМ БЕРУ САПАСЫН ҚАМТАМАСЫЗ ЕТУДІҢ ИНСТИТУЦИОНАЛДЫҚ АСПЕКТІЛЕРІ: ӘЛЕУМЕТТІК-ЭКОНОМИКАЛЫҚ КӨРІНІС

*ПАК Ю.Н.¹

техника ғылымдарының докторы, профессор

НУРГУЖИНА Г.М.²

педагогика ғылымдарының кандидаты, доцент ²Ғұмарбек Дәукеев атындағы Алматы энергетика және байланыс университеті, Алматы қ., Қазақстан Республикасы

ПАК Д.Ю.¹

техника ғылымдарының кандидаты, доцент

ТЕБАЕВА А.Ю.¹

магистр ¹Әбілқас Сағынов атындағы Қарағанды техникалық университеті, Қарағанды қ., Қазақстан Республикасы

АНДАТПА. Жоғары білім сапасын қамтамасыз етудің институционалдық аспектілері қарастырылған. Қазақстандық жоғары білім беру жүйесін біртұтас білім беру кеңістігіне біріктірудің даулы аспектілері зерттелді. Жоғары білімнің инновациялық дамуын тежейтін факторлар талданады. Білім беру сапасын бағалаудың ұлттық жүйесінің ерекшеліктері, оның ішінде енгізу, аралық және шығыс бақылау процедуралары қарастырылады. Жоғары білімнің кеңеюі және оның қолжетімділігі университеттің ең маңызды бәсекелестік артықшылығы ретінде сапаны қамтамасыз ету мәселесін қиындатады. Сапалы білім беру мәдениетін дамыту, Ұлттық біліктілік жүйесін жетілдіру, құзыреттілікке негізделген тәсіл форматында тәжірибеге бағытталған бағдарламаларды әзірлеуде университет пен жұмыс берушінің әлеуметтік серіктестігінің тиімділігін арттыру бойынша ұсынымдар берілген. Жоғары оқу орындарын бюджеттік қаржыландыруды ұлғайту және университет оқытушыларының әлеуметтік жағдайын жақсарту қажеттігі баса айтылды, бұл экономикалық көрсеткіштердің өсуіне оң әсер етеді.

ТҮЙІН СӨЗДЕР: жаһандану және жоғары білім берудің бұқаралық сипаты, білім сапасын қамтамасыз ету, кәсіби және білім беру стандарттары, университет пен жұмыс беруші арасындағы әлеуметтік серіктестік, құзыреттілік моделі, экономикалық өсу.

ИНСТИТУЦИОНАЛЬНЫЕ АСПЕКТЫ ОБЕСПЕЧЕНИЯ КАЧЕСТВА ВЫСШЕГО ОБРАЗОВАНИЯ: СОЦИАЛЬНО-ЭКОНОМИЧЕСКИЙ ВЗГЛЯД

*ПАК Ю.Н.¹ доктор технических наук, профессор

НУРГУЖИНА Г.М.²

кандидат педагогических наук, доцент ²НАО «Алматинский университет энергетики и связи имени Г. Даукеева», г. Алматы, Республика Казахстан

WWW.IAAR-EDUCATION.KZ

ПАК **Д.Ю.**¹ кандидат технических наук, доцент

ТЕБАЕВА А.Ю.¹

магистр ¹НАО «Карагандинский технический университет имени А. Сагинова», г. Караганда, Республика Казахстан

АННОТАЦИЯ. Рассмотрены институциональные аспекты обеспечения качества высшего образования. Изучены противоречивые моменты интеграции казахстанской системы высшего образования в единое образовательное пространство. Анализируются факторы, сдерживающие инновационное развитие высшей школы. Рассмотрены особенности Национальной системы оценки качества образования, включающей процедуры входного, промежуточного и выходного контроля. Расширяющаяся массовизация высшего образования и его доступность обостряют проблему обеспечения качества как важнейшего конкурентного преимущества вуза. Даны рекомендации по развитию культуры качества образования, совершенствованию Национальной системы квалификаций, повышению эффективности социального партнерства вуз – работодатель в разработке практико-ориентированных программ в формате компетентностного подхода. Акцентируется необходимость увеличения бюджетного финансирования высшей школы и повышения социального статуса вузовского преподавателя, что окажет позитивное влияние на рост экономических показателей.

КЛЮЧЕВЫЕ СЛОВА: глобализация и массовость высшего образования, обеспечение качества образования, профессиональный и образовательный стандарты, социальное партнерство вуз – работодатель, компетентностная модель, экономический рост.

INTRODUCTION. In the context of globalization of education, universities are undergoing a transformation. Knowledge loses its value meaning and turns into information as a commodity. Universities are forced to implement a marketoriented strategy, the innovation vector of which is aimed not only at obtaining and transmitting knowledge, but also at creating an entrepreneurial culture, commercializing technologies and the results of intellectual activity [1]. The current stage of higher education modernization has given rise to a lively discussion about the relationship between the fundamental natural science training of bachelors and its practiceoriented component. This dual task a priori

presupposes that bachelor's educational programs should be practice-oriented based on the requirements of employers, and successful continuation of studies at the master's level presupposes that the bachelor must have sufficient natural science training to allow mastering in-depth education in a narrow professional field. The need to maintain orientation towards fundamental natural science training is actualized by the fact that the applied component of specialist training, due to the high dynamics of change, is quickly becoming outdated. The half-life of fundamental knowledge is much higher. How to solve this problem in the conditions of Kazakhstani higher education that has been walking in the spirit

МЕТОДЫ ОБРАЗОВАНИЯ... / METHODS OF EDUCATION...

of the Bologna reforms for 30 years now? When developing bachelor's educational programs in technical specialties, emphasis is placed on a somewhat excessive level of knowledge of a non-applied nature.

The pre-existing five-year engineering training prevails. This model, as evidenced by European practice, is characterized by overproduction of unclaimed knowledge. In the conditions of Kazakhstan reality, such overproduction means training an excessive number of unclaimed specialists. Overproduction of knowledge comes with costs. Despite the fact that all the knowledge is good and there is no such thing as too much knowledge, are any costs for knowledge that is not in demand on the labor market justified? Who and how will assess the absence of demand for knowledge in the dynamically changing market? What knowledge becomes outdated quickly?

MATERIAL AND METHODS OF RESEARCH. In the globalizing economy, vocational education cannot but be a service, and this thesis does not contradict its understanding as a public good. In the process of globalization of education and technological modernization of the economy, contradictions are revealed between the following:

- wide-profile basic and highly specialized education;

- mass character of higher education and the problem of ensuring comparable quality;

- increasing volume of information knowledge and strictly limited training period;

- academic mobility of students and brain drain;

- the ratio of the general education and major disciplines shares in bachelor's educational programs;

- the ratio of the share of compulsory and

university components;

- the principle of unification and preservation of national characteristics;

- level of fundamental natural science training and practice-oriented educational programs.

In the conditions of mass development and expansion of the paid sector of higher education, these contradictions inevitably affect the quality. Despite the decline in the practical value of higher education, there remains consistently high demand for it. The thesis about the prospects for improving living standards with diplomas has been introduced into people's minds. This is seen as the emergence of elements of a "consumer society". The emerging trend of turning higher education into a mandatory attribute of Kazakhstan society creates an institutional conflict between the expanding market of educational services and the need to ensure acceptable quality. The mass character of higher education and its accessibility are considered as factors contributing to decreasing the quality of education [2].

The latest technologies can ensure high quality and competitiveness of manufactured products only with an appropriate level of professional qualifications of personnel. by increasing According to experts, capital, increasing in the efficiency of production activities is possible by only 0.5%, while by increasing qualifications by 2.1% [3]. Present day higher education is designed to form conditions for increasing the competitiveness of human capital, diversifying the structure of the economy in favor of knowledge-intensive industries, and forming a personnel elite of Kazakhstan society. This reinforces the importance of the quality training of specialists.

The quality of education is a

comprehensive characteristic of educational activities and training of students that express the degree of their compliance with the state compulsory education standard of the appropriate level of education, the needs of the individual and legal entity in whose interests the educational activities are carried out, including the degree of achieving the planned results of the relevant educational program. The quality of education for students is, first of all, the knowledge, abilities and practical skills that are needed for successful employment. In other words, a student perceives quality as preparedness for obtaining a prestigious job and career growth. Employers associate high-quality education with the training of specialists who possess the necessary competencies and are able to work in a team, to adapt to dynamically changing production conditions and are ready for continuous professional development.

Ideas of the quality vary not only among groups of participants in the educational process but also taking into account the time factor. Currently, priorities in interpreting the quality of education are shifting towards characteristics of the graduate's abilities. Not only the volume of acquired knowledge comes to the fore but also key competencies, creativity and self-education abilities.

In the process of modernization of higher education, special attention should be paid to the competency model of the graduate. The concept of competency cannot be considered outside the knowledge and skills of the graduate. Many professional competencies begin with the word "ability", as the profiviency to perform certain actions. In the traditional knowledge paradigm (knowledge - abilities - skills), abilities are developed on the basis of knowledge, and skills are formed on the basis of abilities.

The competency-based approach in higher education should not be associated only with skills. Some experts contrast the knowledge and competency models, specifically highlighting the latter as a fundamentally new approach. Most experts believe that competency is the proficiency based on acquired knowledge, skills and abilities to perform successfully professional duties.

The competency-based model of a specialist does not deny the need to obtain knowledge but is based precisely on the foundation of knowledge. In other words, a competency-based model is a squared knowledge-oriented model, а model enhanced by the skills to solve professional problems. There is a concern that when implementing a competencybased approach, the emphasis on skills can reduce the requirements for knowledge. This cannot be allowed. For example, one may not know the theoretical foundations of electrical engineering but be able to solve energy supply issues, or not know legal laws but be able to use the "consultant plus" system. If there is a lack of knowledge, the formed competencies in the form of "be able to" will be unstable and of a superficial nature.

Recognizing the need for social partnership between higher education and the world of work, and realizing the insufficient development of the National Qualifications System and Professional Standards, it is important to update competency-based educational programs taking into account foresight analysis data on in-demand competencies, the analysis of the developed labor market, generalization of advanced foreign experience and systemic communication with professional employers' associations [4].

The competency-based model of

МЕТОДЫ ОБРАЗОВАНИЯ... / METHODS OF EDUCATION...

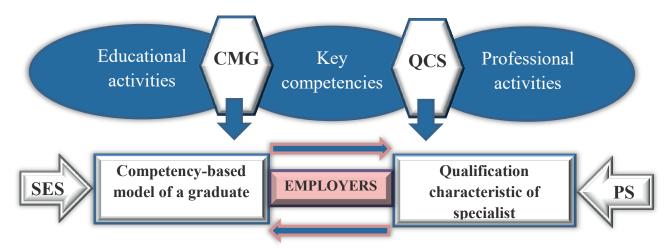


Figure 1 - The graduate's competency-based model

a graduate involves the combination of educational (SES) and professional (PS) standards, taking into account the requirements of employers, the specifics of educational and professional activities (see Figure).

In the professional sphere, qualifications are formed as a set of labor functions outlined in professional standards. Therefore, qualifications assigned to graduates who have mastered competencybased educational programs will differ from the qualification characteristics of a specialist in the field of labor [5].

RESULTS AND THEIR DISCUSSION. In the era of global changes, the problem of increasing the intellectual potential of society is becoming more urgent. The key role is played by higher school, whose main competitive advantage is the quality of education.

Despite significant experience in studying the content of the quality category, there are still no generally accepted definitions: quality as a certain level of knowledge, skills and abilities; quality as a set of personal qualities that determine the ability to perform functional tasks; quality as a social category that determines the state and effectiveness of education; quality as the relationship between goal and result, as a measure of goal achievement; quality is a multidimensional concept that cannot be specified [6] (figure 1).

Well-known experts in the field of higher education L. Harvey and D. Green [7], based on an analysis of the differentiated concepts of "quality," identified its individual interrelated categories: exclusivity, impeccability, expediency, the ability to transform, the optimal price-quality ratio. This means that when developing criteria for assessing quality, different conceptual approaches are possible that reflect the subjective attitude of stakeholders.

Present day higher education is generally regarded as a social good and as a service. In accordance with this, the goal of higher education and learning outcomes are formulated. The triple goal is training, education and development [8]. The goal of training is the formation of knowledge, skills and abilities of students. The goal of education is the formation of students' personal qualities, norms and rules of behavior. The goal of development is the development of cognitive abilities and readiness for continuous education

throughout the entire working life. All these three goals that are of a teaching, educational and developmental nature, are implemented in a single teaching, research and educational process.

The problem of quality assurance is closely related to the Concept of lifelong education officially adopted by the UNESCO as a strategic element designed to improve the structure and the content of the education system, giving it flexibility and efficiency. "Lifelong education" is the leading principle of the economics of education, in which the learning process alternates with the labor process in time and space, and knowledge and competencies are acquired through a variety of forms and methods of education, including self-educational activities. The concept of continuous competency-based education based on student-centered educational programs should become one of the leading ones in the design of state educational standards of the new generation.

The mass character of higher education is determined not so much by the demand for workers but by the demand for higher education as a certain social value. In the developed market economy, two independent markets have been formed: the educational services market and the labor market. In these markets, demand is determined by the population, and universities and enterprises (organizations) offer educational services and jobs, respectively. In this regard, the universityenterprise social partnership should be assessed as a means of increasing the effectiveness of educational services with economic life, the world of work and the necessary balance of demand and supply of qualifications, skills and competencies in the labor market [2].

When ensuring the quality of education comprehensive characteristic of as а educational activities, there are various academic approaches. Some view this problem as purely managerial one, linking it with the effectiveness of the university's quality management internal system. Proponents of another approach advocate the relationship of this problem with the quality of educational standards and programs. The ideology of the third approach is based on the level and quality of the educational process and its infrastructure. This diversity of academic approaches can be summarized as the quality of the educational process conditions and the quality of learning outcomes.

Experience shows that the most common form of quality control is a combination of internal and external quality control. In most countries, the main tool for monitoring the quality of education is independent accreditation.

Kazakhstan has a National Quality Assessment System that includes various control and evaluation procedures. The role of incoming control is performed by licensing procedures and Unified National Testing. The components of final control are the final certification of students, accreditation of the university (educational programs) and ratings.

Replenishing universities with interested students is a modern way to increase the effectiveness of higher education in the context of improving quality and competitiveness. Searching for talented youth should be carried out through direct agreements between the university and schools, through creative competitions, Olympiads, various projects, personal portfolios reflecting the psychological characteristics and social activity of the youth.

The transition of Kazakhstan to the innovative economy involves changing the structure of demand for university graduates. This challenge focuses on increasing the effectiveness of social partnership between higher education and the business community in the context of improving the quality and competitiveness of higher education. The successful development of the National Qualifications System involves developing organizational and legal mechanisms for mutually beneficial partnership between the education system and the world of work.

Parity participation of stakeholders (the sphere of labor and the education system) is important in the formation of the qualification characteristics of a graduate specialist in the format of competencies. In professional standards, employers indicate the applied aspect of the employee's knowledge and skills he needs to perform specific work within the framework of labor functions. What is needed for him to have this knowledge, skills and competencies is a question for the field of education. This actualizes the need to involve not only professional experts in a certain sector of the economy but also representatives of the university system as developers of professional standards.

Educational policy and a system for certification of specialist qualifications should be formed on the basis of professional standards and the requirements of the real sector of the economy. The core of the National Qualifications System should be professional and educational standards that ensure the relationship between professional training and the requirements of a changing economy (see Figure).

The quality management system

(QMS) introduced in higher education in Kazakhstan contributed to establishing interaction with consumers and customers of educational services, streamlining the processes of ensuring the quality of education and optimizing the document flow. Experience in the functioning of the QMS shows its insufficient effectiveness in terms of real quality assurance. The reason is the excessive enthusiasm for formal procedures, insufficient attention to the methodological aspects of quality assurance, in particular, weak interest of participants in the educational process (teaching staff, students) in updating the content of education, the teaching technology and the knowledge control, and improving the quality of the pedagogical process. The QMS has noticeably increased the document flow and is mainly aimed at formalizing management. The effectiveness of the QMS depends largely on how well it is documented. But developing documents is not an end in itself. They are needed to define management and development methods and to create criteria for testing the system. The ISO 9001 standard requires a minimum of documentation. The university itself determines the depth of describing the processes and the scope of work instructions. The main thing for a university is not a huge amount of paperwork but the creation of a clear system of interaction at the horizontal level, defining requirements for processes and distributing responsibilities and powers. The value of the QMS is not in documents but in specific actions aimed at ensuring the quality of education.

At European universities, the concept of "quality culture" has been developed, due to the transformation of the meaning of quality as a shared value and collective responsibility of all the subjects of the educational

process [9]. The Berlin Communique of the Ministers of Education of the countries participating in the Bologna Process noted that "responsibility for ensuring the quality of higher education lies, first of all, with the universities themselves".

An important component of the quality culture is the teaching work, the quality of result-oriented teaching. At a modern university, educational and research activities should harmoniously complement each other. Unfortunately, a teacher-researcher has less time for educational work. Research successes are often achieved by reducing the teaching costs and at the expense of the quality of educational services. The difficulty in achieving an optimal balance between the educational and research components of a university teacher lies in the difficulty of formalizing these components. Scientists-teachers are more interested in developing a scientific career than in gaining fame as a professor. This is the essence of the contradiction that needs to be resolved by optimizing scientific and educational reforms.

An important role in implementing the culture of quality belongs to the university management that ensures the setting of quality policy targets and systematic institutional changes, as well as managing the quality of education.

CONCLUSION. In the context of the expanding mass availability and accessibility

of higher education, methodological problems of quality assurance should become the main vector of modernization of higher education. To increase the effectiveness of educational reforms, it is necessary to increase systematically funding for higher education to the average European level (~2% of GDP); do not slow down the pace of improving the social status of university teachers and increasing the level of remuneration. The integration of Kazakhstani higher education into a single educational space needs to be carried out more carefully, taking into account national priorities. We should not mechanically copy Western experience at a faster pace. The administrative format of accelerated modernization without the support of the academic community of universities can lead to superficial solutions.

It seems relevant to improve accreditation standards and criteria in the direction of strengthening student-centered learning in the format of a competency-based approach, the quality of the organization of the scientific and educational process, the quality and relevance of educational programs, the quality of teaching and the level of infrastructure support; accelerate introducing at universities the culture of quality education as a shared value and collective responsibility of all the subjects of the educational process.

СПИСОК ЛИТЕРАТУРЫ:

1. Риддингс, Б. Университет в руинах / Б.М. Риддингс. – М.: Изд-во ГУ ВШЭ, 2010. – 300с.

2. Пак, Ю.Н. Проблемы модернизации высшего образования в контексте обеспечения качества / Ю.Н. Пак, Г.К. Кошебаева, Д.Ю. Пак // «Alma mater» (Вестник высшей школы). – 2019. - № 12. - С. 14-21.

3. Царегородцев, Ю.Н. Образование как основа формирования человеческого капитала / Ю.Н. Царегородцев, О.Э. Башина, М.В. Карманов // Ученый совет. – 2017. - № 1. - С.12-20.

4. Пилипенко, С.А. Сопряжение ФГОС и профессиональных стандартов: Выявленные проблемы, возможные подходы, рекомендации по актуализации / С.А. Пилипенко, А.А. Жид-

МЕТОДЫ ОБРАЗОВАНИЯ... / МЕТНОДЅ OF EDUCATION...

ков, Е.В. Караваева, А.В. Серова // Высшее образование в России. – 2016. - № 6. - С. 5-14.

5. Шехонин, А.А. Гармонизация квалификаций в системе высшего образования и в сфере труда / А.А. Шехонин, В.А. Тарлыков, А.О. Вознесенская, А.В. Бахолдин // Высшее образование в России. – 2017. - № 11. - С. 5-11.

6. Пак, Ю.Н. Проектирование образовательных программ при обучении в формате компетенций / Ю.Н. Пак, Д.Ю. Пак // Education. Quality assurance. – 2020. - №4 (21). - С. 36-40.

7. Harvey, L. Defining Quality / L. Harvey, D. Green // Assessment and Evolution in Higher Education. – 1993. - Vol. 18, No 1. - P. 9-13.

8. Корчагин, Е.А. Компетентностный подход и традиционное представление о высшем образовании / Е.А. Корчагин, Р.С. Сафин // Высшее образование в России. - 2016. - № 11. - С. 47-54.

9. Мешкова, Т.А. Качество преподавания как потенциальная часть культуры качества в вузе / Т.А. Мешкова // Вопросы образования. - 2010. - № 3. - С. 115–134.

REFERENCES:

1. Riddings, B. (2010). *Universitet v ruinah [University in ruins]*. M.: Izd–vo GU VSHE, 300 p. [in Russian].

2. Pak, Ju.N., Koshebaeva, G.K. & Pak, D.Ju. (2020). Problemy modernizacii vysshego obrazovaniya v kontekste obespecheniya kachestva [Problems of modernization of higher education in the context of quality assurance]. *"Alma mater" (Bulletin of Higher School), 12*, 14-21 [in Russian].

3. Caregorodcev, Y.N., Bashina, O.E. & Karmanov, M.V. (2017). Obrazovanie kak osnova formirovaniya chelovecheskogo kapitala [Education as the basis for the formation of human capital]. *Academic Council*, *1*, 12-20 [in Russian].

4. Pilipenko, S.A., Zhidkov, A.A., Karavaeva, E.V. & Serova, A.V. (2016). Sopryazhenie FGOS i professional'nyh standartov: Vyyavlennye problemy, vozmozhnye podhody, rekomendacii po aktualizacii [Connection of Federal State Educational Standards and professional standards: Identified problems, possible approaches, recommendations for updating]. *Higher education in Russia, 6*, 5-14 [in Russian].

5. Shekhonin, A.A., Tarlykov, V.A., Voznesenskaya, A.O. & Baholdin, A.V. (2017). Garmonizaciya kvalifikacij v sisteme vysshego obrazovaniya i v sfere truda [Harmonization of qualifications in the higher education system and in the world of work]. *Higher education in Russia, 11*, 5-11 [in Russian].

6. Pak, Ju.N. & Pak, D.Ju. (2020). Proektirovanie obrazovatel'nyh programm pri obuchenii v formate kompetencij [Designing of educational programs on training in the format of competencies]. *Education. Quality Assurance, 4*(21), 36-40 [in Russian].

7. Harvey, L. & Green, D. (1993). Defining Quality. *Assessment and Evolution in Higher Education*, *18*(1), 9-13.

8. Korchagin, E.A. & Safin, R.S. (2016). Kompetentnostnyj podhod i tradicionnoe predstavlenie o vysshem obrazovanii [Competence-based approach and traditional understanding of higher education]. *Higher education in Russia, 11*, 47-54 [in Russian].

9. Meshkova, T.A. (2010). Kachestvo prepodavaniya kak potencial'naya chast' kul'tury kachestva v vuze [Teaching quality as a potential part of a quality culture in a university]. *Education issues, 3*, 115-134.

СВЕДЕНИЯ ОБ АВТОРАХ:

***Pak Yuri** - Doctor of Technical Sciences, Professor, "Abylkas Saginov Karaganda Technical University" HJSC, Karaganda, Republic of Kazakhstan E-mail: pak_gos@mail.ru

Nurguzhina Gulara - Candidate of Pedagogical Sciences, Associate Professor, "G. Daukeyev Almaty University of Power Engineering and Telecommunications" NJSC, Almaty, Republic of Kazakhstan

E-mail: gularanurg56@mail.ru

Pak Dmitri - Candidate of Technical Sciences, Associate Professor, "Abylkas Saginov Karaganda Technical University" NJSC, Karaganda, Republic of Kazakhstan E-mail: pak_kargtu@mail.ru

Tebayeva Anar - Master, Lecturer, "Abylkas Saginov Karaganda Technical University" NJSC, Karaganda, Republic of Kazakhstan E-mail: anara.tebaeva@gmail.com

***Пак Юрий Николаевич** - техника ғылымдарының докторы, профессор, «Әбілқас Сағынов атындағы Қарағанды техникалық университеті» КеАҚ, Қарағанды қ., Қазақстан Республикасы E-mail: pak_gos@mail.ru

Нургужина Гулара Мауленовна - педагогика ғылымдарының кандидаты, доцент, «Ғұмарбек Дәукеев атындағы Алматы энергетика және байланыс университеті» КеАҚ, Алматы қ., Қазақстан Республикасы E-mail: gularanurg56@mail.ru

Пак Дмитрий Юрьевич - техника ғылымдарының кандидаты, доцент, «Әбілқас Сағынов атындағы Қарағанды техникалық университеті» КеАҚ, Қарағанды қ., Қазақстан Республикасы E-mail: pak_kargtu@mail.ru

Тебаева Анар Юлаевна - магистр, оқытушы, «Әбілқас Сағынов атындағы Қарағанды техникалық университеті» КеАҚ, Қарағанды қ., Қазақстан Республикасы E-mail: anara.tebaeva@gmail.com

*Пак Юрий Николаевич - доктор технических наук, профессор, НАО «Карагандинский технический университет имени А. Сагинова», г. Караганда, Республика Казахстан E-mail: pak_gos@mail.ru

Нургужина Гулара Мауленовна - кандидат педагогических наук, доцент, НАО «Алматинский университет энергетики и связи имени Г. Даукеева», г. Алматы, Республика Казахстан

E-mail: gularanurg56@mail.ru

Пак Дмитрий Юрьевич - кандидат технических наук, доцент, НАО «Карагандинский технический университет имени А. Сагинова», г. Караганда, Республика Казахстан E-mail: pak_kargtu@mail.ru

Тебаева Анар Юлаевна - магистр, преподаватель, НАО «Карагандинский технический университет имени А. Сагинова», г. Караганда, Республика Казахстан E-mail: anara.tebaeva@gmail.com