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Summary**ENGINEERING EDUCATION AS A SOURCE OF INCREASING COMPETITIVENESS IN THE INTERNATIONAL MARKET**

A.S. Guzenkova, M.O. Nereto, I.N. Isaeva, D.M. Makrushina
National Research University Higher School of Economics

The article is devoted to the actual task of increasing competitiveness in the international market of educational services, the possibilities of the system of pre-university training of foreign citizens in this process are considered. Some methodical recommendations of training on engineering and technical profile are given from the accumulated experience of the preparatory department for foreign citizens of the Higher School of Economics.

INTEGRABILITY AS A WAY TO INCREASE THE PRACTICAL FOCUS OF ENGINEERING EDUCATION PROGRAMS

A.I. Blesman, V.V. Danshina
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The GEF non-compliance is revealed with the needs of the regional labor market. The concept of PLO is presented, in which mechanisms are developed to increase the attractiveness of the PLO in the market of educational services: the passage of professional public accreditation and the introduction of practice-oriented training. It is shown that the integration of professional standards in the educational process will increase the practical focus of engineering training.

INTEGRAL ESTIMATIONS OF DISCIPLINES AND TEACHERS BASED ON STUDENT SURVEYS

O.Yu. Belash, Ya.S. Ryaskov
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The article is devoted to the methodology of calculating the integral estimation of disciplines and teachers based on student

surveys conducted after each semester. Disciplines and teachers are evaluated by students on several indicators; an integral estimation of each discipline and each teacher is calculated taking into account the weight coefficients of the indicators. The received estimations of disciplines and teachers characterize the quality of an educational program implementation.

TECHNICAL EDUCATION IN RUSSIA: PROBLEMS, WAYS OF SOLUTION

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The problems of providing the country's economy with qualified personnel with higher education are considered. The necessity of the modernization of higher education, aimed at training engineers is shown. The level gap in training specialists led to the violation of the system of technical education. It is proposed to restore the training of engineers in key (key) specialties. To provide the personnel of the developing sphere of services with the introduction of an "applied" bachelor's degree with a reduced period of study.

THE ROLE AND PLACE OF TEACHERS OF GENERAL TECHNICAL DISCIPLINES IN MODERN ENGINEERING EDUCATION

A.K. Tomilin, E.N. Pashkov
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The article analyzes the main modern requirements for the competencies of the technical university teacher. Attention is drawn to the methodological aspects of teaching general technical disciplines and providing the educational process with modern electronic educational resources. The problem of an objective assessment of the teacher's work quality is touched upon. Proposals are being made to develop the competencies of the higher educational institution of the university.

**ENGINEERING PEDAGOGICS
IN THE SYSTEM OF FORMATION
OF UP-PROFESSIONAL COMPETENCES
OF LINEAR ENGINEER**

R.Z. Bogoudinova, U.A. Kazakova
Kazan National Research Technological
University

The article reveals new approaches to the description of the place and role of pedagogy in engineering, the formation of engineering thinking, the humanistic focus of engineering education. The special importance of interdisciplinarity, transdisciplinarity in the process of training specialists for the digital economy, as well as the conditions and opportunities for the training of professionally-oriented bachelors for the order of industries capable of modernizing technological processes is substantiated.

THE REGIONAL ASPECTS OF STAFF TRAINING FOR WORK IN LAND RECLAMATION: INVERSE RELATIONSHIP EFFECT

G.V. Olgarenko, V.V. Kashtanov
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This article discusses the issues of training methods using in the skills up-grading system and re-training of the engineering staff in the field of land reclamation. Based on experience and statistics analysis, there is presented the attention of persons interested in continuous training of farming experts to the organization order and staff training level.

**PEDAGOGICAL SCHOOL
OF THE THEORY OF WORKFLOW
AND TESTING OF GAS TURBINE ENGINES
OF SAMARA UNIVERSITY**

V.A. Grigor'ev, V.S. Kuz'michev,
S.V. Lukachev, V.N. Matveev
Samara National Research University
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Brief history of pedagogic school of Theory of workflow and testing of gas turbine engines of Samara University is provided. The features and benefits of the courses of Theory of gas turbine engines, Theory and calcu-

lation of blade machines, Workflow theory of combustion chambers and Testing aircraft engines are considered.

PROBLEMS OF MODERN NATURAL-SCIENTIFIC PHYSICAL EDUCATION IN TECHNICAL HIGHER EDUCATION

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In recent years, physics has been seriously hampered by the fact that most of today's graduates do not have sufficient knowledge of physics. There is no doubt that the physical disciplines in a technical university already in the first year should be studied at a sufficiently high mathematical level. The course of general physics should be built as a consistent single course. In teaching physics, you need to use both classical traditional techniques and modern computer techniques. The use of personal computers makes it possible to largely solve the problem of differentiation of education. In many physics teaching programs, there is both information and testing functions. One of the main tasks of improving higher education in the country is to increase the effectiveness of independent student teaching. The essential factor determining the success of independent work is its planning. Knowledge control is one of the main forms of the learning process, and its condition must be brought into line with the new conditions and tasks of the development of higher education.

ACADEMIC MOBILITY OF TECHNOLOGICAL UNIVERSITY STUDENTS IN HIGHER EDUCATIONAL INSTITUTIONS OF FRANCE

N.V. Kraysman, F.T. Shageeva
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University

The paper focuses on the academic mobility of the technological university students as a result of cross-disciplinary programs mastering of additional education. The program "Professional translation" directed to the formation of professional communicative competence in French is represented. The graduates of this program successfully participate in the linguistic trainings, take the

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international examinations, continue the vocational training at the French universities.

INFORMATION ACTIVITY OF TEACHERS OF HIGHER EDUCATION AS A STATE ORDER FOR STANDARDIZATION OF PROFESSIONAL ACTIVITY

N.Yu. Bugakova
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The article deals with the subject of information activities in the field of education in federal state educational standards and professional standards of teachers at different levels. The structure of the informational potential of the teacher's personality and the conditions for its development are presented. The structural elements of the information and educational environment are defined as factors of involvement in the information activity of university teachers.

CONCEPTUAL MODEL OF FORMATION SYSTEM ENGINEERING COMPETENCE: ESSENCE AND DIDACTIC TOOLS

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Development
V.V. Likholetov
South Ural State University (National
Research University)

The requirements of the new technological structure to engineering activity and engineering training are analyzed. The conceptual model of formation of system engineering competence of students within which pedagogical tasks of each stage and functions of didactic tools are defined is offered.

THE SKILLS DEVELOPMENT OF SYSTEM THINKING IN STUDENTS OF ENGINEERING SPECIALIZATION (ON THE EXAMPLE OF THE DEPARTMENT OF GEOTECHNICS SPBGASU)

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Saint Petersburg State University
of Architecture and Civil Engineering

The article examines the role of the educational institution in the formation of the engineering thinking of future subjects of la-

bor. Defined the special aspects of engineering thinking and contradictions which has to be overcome in the professional work. As a developing technology of the systematical thinking of an engineer, the authors propose to use a Mind map that was integrated into the educational process of geotechnical students in 2016–2018, and showed its effectiveness in practice.

EDUCATIONAL AND RESEARCH COMPLEX FOR AUTOMATED GAS TURBINE ENGINES TESTING

V.A. Grigor'ev, P.G. Zubkov,
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The article analyzes the types of management technologies used in the system of engineering education, with examples of their use and opportunities for updating in accordance with the requirements, regulated by the Federal law "On education in Russian Federation". Recommendations in choosing the type of managerial technologies in engineering education with the aim of improving its quality in modern conditions are provided in the article.

DEVELOPING DIGITAL COMPETENCIES FOR SCIENTIFIC AND ACADEMIC WORK OF POSTGRADUATE SCHOOLS

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Graduate students as young future researchers or research teachers should have a number of additional competencies that will allow them to develop new areas of research and at the same time be engaged in teaching activities in the real sector of the economy with large-scale digital transformation of the real economy. The format of postgraduate schools has been proposed, and additional competencies should be noted that can be formed during the course of study at postgraduate schools. In the course of training in the graduate school, several test assessments are planned that need to be passed to successfully complete the school course, where goal-setting in the digital economy will be

the main issue, and planning for achieving the goals, including using road maps, will be additional. Processing and analysis of big data: education in a graduate school will be designed in such a way that students will need to analyze data from lectures and workshops, review materials, databases, etc. to get answers to questions during testing and final certification. Self-assessment and evaluation of the success of others: a graduate student will be able to assess their success with the help of assessments for the final certification. In addition, during the collective work in the graduate school, each student, after passing the tests, will be able to see the number of correct answers to the questions during group work, which is necessary for the organization of modern processes of teamwork in engineering practice. The ability to convey the material of complex concepts of the digital economy in a generalized way to the employer, other students, future consumers of digital goods and services. During the work of the postgraduate school for educating research teachers, a clear understanding of the digital economy and its "cross-cutting" technologies was planned. The basis for using knowledge and skills in the real economy should be an understanding of the technological base that is currently available.

THE ROLE OF FOREIGN LANGUAGE SOURCES IN THE FORMATION OF STUDENTS' ANALYSIS SKILLS WHILE PERFORMING INDIVIDUAL WORKS

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The article contains the analysis of the need and the possibility of using foreign language sources by students while performing individual works and provides recommendations on the formation of analysis skills of foreign publications in order to obtain relevant scientific and technical information about the current experience of experts in other countries on the topic explored.

METHODICAL ASPECTS AND IMPLEMENTATION OF THE PROGRAM OF ADDITIONAL PROFESSIONAL EDUCATION

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University

In article tasks of additional professional education of experts are considered. Problems of implementation of additional educational programs of training of workers for chemical production reveal. Methodical aspects of the organization of process of training are shown.

ONCE AGAIN ON THE CHALLENGES FACED IN THE INTERACTION BETWEEN EDUCATION AND LABOR MARKET

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The article deals with the aspects of the interaction of the education and labor market, their negative aspects which hamper the establishment of business relations between universities and large corporations. Undoubtedly, both sides are guilty in this situation, but the main culprit, of course, is the university. Firstly, state universities are rather conservative and do not always react quickly and efficiently to business appeals. And business cannot wait indefinitely, because time is the main resource for business. In addition, the unprofessional performance of university together with the poor organization of methodological work, this does not allow quickly formulating «breakthrough» technological ideas in the educational process have their impact. When satisfying business requests, the latter would not have the desire to open corporate universities, i.e. to compete with universities in the educational market and I must say to compete quite successfully.

To train specialists who meet the demands of the labor market, it is necessary to have teachers with a high level of professional competence and their ability to convey knowledge of the specifics to professionals. Today, universities are not able to independently provide the graduate with current specialized knowledge, which has led to the "washing away" of professional personnel

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from the enterprise associated with the age of the latter. To begin training personnel at the enterprises' request, the university needs to develop programs, integrate them into the educational process, recruit and train teachers, as their own university's lecturers are not always ready for it.

CONTINUING ENGINEERING EDUCATION REQUIRES INSTITUTIONAL SUPPORT

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The article raises the issue of the need to fix in professional standards - the main normative documents in the field of qualifications - requirements concerning the mandatory continuity of professional competencies of employees, including through the institution of additional professional education. Options are proposed for introducing these requirements without changing the established format of professional standards. It also proposed a list and justified the need to include indicators of university activities related to additional professional education in the indicators of state reporting and domestic university rankings.

BLENDED LEARNING: DESIGN AND ORGANIZATION CHARACTERISTICS ON THE BASIS OF INTERNET RESOURCES

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The article is devoted to the issues of informatization of engineering education in accordance with the needs of the digital economy. The purpose of this article is to analyze the didactic capabilities of digital technologies, to study the ways of using information technologies in the training process of future engineers, to consider models for integrating educational technologies with modern digital technologies. The article identifies the main characteristics of blended learning, as a means of implementing an integrated learning model with the involvement of Internet resources.

ROBOTICS: DEMANDED SKILLS OF HIGHLY QUALIFIED SPECIALISTS

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This article focuses on key skills of researchers and engineers in the field of robotics, which are demanded by employers in Russia and in the world. Information about demanded skills is collected using two methods: the text-mining analysis of open-access vacancies in the field of robotics both in Russia and abroad, and in-depth interviews with Russian employers. Lists of the most demanded skills in Russia and abroad coincide. Russian specifics are the importance of English language proficiency and knowledge of national standards for technical documentation.

ECOLOGIZATION OF THE EDUCATIONAL ENVIRONMENT TECHNICAL EDUCATION

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In this article, the idea of ecologizing the educational environment of a technical college is substantiated. The author proposes, from the standpoint of the process approach, the involvement and interaction of the administration-teachers-students in creating conditions for the development of the environmental consciousness of students, increasing their adaptation to learning.

INDICATORS OF EDUCATION QUALITY IN INTERNAL MONITORING: DIFFERENCE BETWEEN STUDENTS AND LECTURERS IN ASSESSING INDICATORS IMPORTANCE

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This article provides an overview of indicators used in education quality internal monitoring based on students' surveying, and also stresses the need to take into account the different importance of indicators analyzed in education quality assessment. The study presents the differences between the opinions of students and lecturers regarding the importance of the indicators used in

education quality internal monitoring in Saint Petersburg Electrotechnical University. As a result of the students' and lecturers' surveying on engineering faculties, it was revealed that the strongest difference in students' and lecturers' opinions is found for such disciplines indicators as the amount of theoretical training and the amount of practical training. In assessing the importance of indicators concerning the quality of teaching, students prioritize the clarity and consistency of presentation, as well as the modernity of teaching material. The results of the study should be taken into account in the integral assessment of educational process quality.

SOCIOCULTURAL BASES OF PROFESSIONAL MOBILITY OF THE FUTURE SPECIALIST

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The relevance of the present study is due to the fact that for the modern man is important the ability not only to learn, develop, but also to be prepared for the ever-changing conditions of life, work. It is about readiness and ability to implement professional mobility. Analysis of trends in the development of the education system in the framework of the documents of the Bologna process has led to the conclusion that the formation of such a quality of a specialist as professional mobility is one of the means to improve the efficiency of education.

The aim of the study is to identify the socio-cultural foundations of professional mobility of the future specialist. Based on the anthropological concept, we argue that culture is proportionate to man. Integrating nature and society, the legacy of a man and the life of the individual, the culture brings in a whole material and ideal. Culture consolidates time and space of human existence. Culture is a manifestation of the creative nature of man, which is the strongest factor and the most important condition for professional development, the formation of his professional mobility. The leading methods are the inclusion of students in the implementation of practice-oriented tasks, research projects, activating the creative component of professional mobility.

The process of formation of professional mobility of the future specialist is considered in

the framework of the system of continuous education aimed at the formation of personality with "achievable" type of motivation. The transition from one level of professional mobility to another contributes to the development of the future specialist's susceptibility to changes, innovations in the process of professional activity, the formation of a highly cultural personality responsible for the consequences of professional decision-making.

TECHNOLOGY OF ORGANIZATION OF EDUCATIONAL ENVIRONMENT OF THE UNIVERSITY

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The formation of the developing environment of the University is a necessary condition for the training of highly qualified engineers. The purpose of technology organization of the developing environment of the University is to create conditions for the formation of readiness for the management of intellectual property. To achieve the goal, the following tasks are solved: creation of organizational and managerial support; creation of a system of motivation for the management of intellectual property; consulting, teaching of relevant disciplines; establishment of links with organizations that make up the infrastructure of the intellectual property market.

QUALITY EXAMINATION OF THE TEST RESULT

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When assessing the quality of a student's knowledge gained through testing, each time a question arises: how objective is the result of this test obtained? Obviously, the objectivity of the student's result depends both on the accuracy of the test, both on the tool and on the length of time (within reasonable limits) allowed for this test. The paper proposes a sound methodology for assessing the objectivity (quality) of the test result, which can be easily applied in practice.

Профессионально-общественная аккредитация образовательных программ (результаты)

Ассоциация инженерного образования России более 20 лет работает над созданием и развитием системы профессионально-общественной аккредитации образовательных программ в области техники и технологий в России.

АИОР является членом самых авторитетных международных альянсов по аккредитации инженерных образовательных программ, таких как Международный Инженерный Альянс (International Engineering Alliance), Вашингтонское соглашение (Washington Accord), Европейская сеть по аккредитации инженерного образования (European Network for Accreditation of Engineering Education, ENAEE). АИОР – единственная организация в России, имеющая право присуждать аккредитованным программам европейский знак качества EUR-ACE label.

Профессионально-общественная аккредитация инженерных образовательных программ, проводимая АИОР, признана в большинстве развитых стран мира и является международной.

По результатам на 19.12.2018 процедуру профессионально-общественной аккредитации АИОР прошли 535 образовательных программ (первого и второго цикла) 78 ведущих вузов России, Казахстана, Киргизии, Таджикистана, Узбекистана, Колумбии. Европейский знак качества EUR-ACE label присвоен 453 программам. Кроме того, аккредитовано 5 образовательных программ среднего профессионального образования. Списки аккредитованных АИОР программ регулярно публикуются на сайтах АИОР (www.ac-raee.ru/ru/reestr_programm.htm), ENAEE (eurace.enaee.eu), FEANI (www.feani.org/european-engineering-education-database/eed-database), Washington Accord (www.ieagrements.org), в Системе мониторинга профессионально-общественной аккредитации (accredpoa.ru).

Наличие у вуза образовательных программ, имеющих международную аккредитацию, способствует укреплению престижа вуза в России и в мире, привлечению российских и иностранных студентов, расширению академической мобильности студентов, разработке совместных с зарубежными университетами образовательных программ, дает возможность выпускникам вуза претендовать на получение статуса профессионального инженера в международных регистрах АПЕС, FEANI.

Реестр образовательных программ, успешно прошедших процедуру профессионально-общественной аккредитации в АИОР, приводится далее.