

Summary

SUPPORT FOR ELITE ENGINEERING EDUCATION: STUDENT CREATIVE WORKSHOPS

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The paper considers elite engineering education provided at the higher education institution of architecture and civil engineering. The elements of the educational process have been described. The regional employers are supposed to play an important role in setting learning outcomes, therefore, the questionnaires filled out by the representatives of civil engineering enterprises have been analyzed. The paper also describes the results of the poll held among the institution graduates. The authors of the paper have analyzed the poll data with due regard to the fact whether the respondent participated in the student creative workshop for designing and developing e-learning resources on geodetics engineering at Novosibirsk State University of Architecture and Civil Engineering (Sibstrin). The authors suggest that student professional creative workshops play a significant part in providing elite engineering education at the higher education institution of architecture and civil engineering.

THOUGHT PROCESS OF ENGINEERING "ELITE FORCE": RUSSIAN DEVELOPMENT TECHNOLOGIES

A.V. Kozlov
Siberian Federal University

The paper studies potential of Russian cognitive technologies of creative engineering thinking. The technologies are based on applied dialectics or the Theory of Inventive Problem-Solving (TRIZ)

and can be applied in the elite engineering education. The author suggests using tested didactic technologies.

PROJECT OF INNOVATIVE ENGINEERING EDUCATION

V.A. Prokhorov
North-Eastern Federal University in Yakutsk

The paper provides the analysis of engineering education and proves the necessity to develop an innovative engineering education programme. Basic principles of the innovative education programme as well as qualifications of engineering Bachelor's degree programmes are suggested. Education modules of the suggested programme are described.

HUMANITIES AND SOCIAL TECHNOLOGIES TO DEVELOP ENGINEER'S PERSONAL POTENTIAL IN SELF-DEVELOPING UNIVERSITY ENVIRONMENT

E.A. Evstifeeva, A.A. Tyagunov, S.V. Rassadin, S.I. Filippchenkova
Tver state technical university

Techno-humanitarian balance conditions the prospects of human survival as well as competitiveness of Russian industry on the global market. This balance depends strongly on such engineers' qualities as way of thinking, ethical priorities and reflexive positioning.

The article describes a practice-oriented approach to study personal potential of modern engineers, development of their personal qualities by means of socio-humanitarian technologies and reflexive approach used in educational process.

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ISSUES OF FOSTERING STUDENTS' ARTISTIC TASTE IN THE PROCESS OF ENGINEERING

K.B. Danilenko
Bauman Moscow State Technical University

The article justifies the need to develop such personal skills of future engineers, as the artistic taste, the sense of beauty, and the inner personal culture. The basic requirements towards mechanical components, connection joints and structures are addressed allowing the creation of not only technically ingenious, but also eye-catching products that would be notable for their harmonic configuration and beauty. Special emphases are put on the phenomenon of golden ratio, inherent to the most attractive and beautiful items created by nature or by human.

PREPARATION AND CONDUCT OF WORLDSKILLS COMPETITION AS AN INNOVATIVE METHOD OF TECHNICAL STUDENT TRAINING IN VOCATIONAL EDUCATION SYSTEM

V.G. Doronkin, V.V. Eltsov, E.M. Chertakova
Tolyatti State University

The paper examines the issues concerning preparation and holding of professional skill competitions between experts in automotive repair. It also provides the assessment of auto mechanic training in terms of its conformity with the global requirements to technical specialists of the automotive service industry.

ELECTRONIC PRESENTATION AS A FACTOR TO IMPROVE LEARNING OUTCOMES IN MATHEMATICS: THE CASE OF ELITE ENGINEERING EDUCATION

O.V. Yanuschik, E.G. Pahomova
National Research Tomsk Polytechnic University
N.Y. Galanova
National Research Tomsk State University

The paper describes the dependence of the quality of mathematics education on the methods applied at lectures delivered for elite engineering students. Two approaches to giving lectures, conventional and presentation-based, are compared. The academic progress performed by students within the frameworks of these two approaches is assessed. The assessment is based on the comparative analysis of the results achieved by students doing theoretical tasks in different sections of the course.

UNIFICATION OF ENGINEERING EDUCATION PROGRAMMES

V.S. Gryzlov
Cherepovets state University

The article deals with the unification of engineering academic programmes. It provides a professional functional map and generalized analysis of the competencies included in FSES in engineering. The author suggests a unified engineering education model developed in terms of the structure of basic competencies and including competency-based modules.

COMPETENCY-BASED APPROACH TO EDUCATION PROGRAMME DEVELOPMENT: THE CASE OF TECHNOLOGY AND ENGINEERING TEACHER QUALIFICATION (TECHNOLOGY OF LIGHT INDUSTRY)

O.V. Ezhova
Kirovohrad Volodymyr Vynnychenko State Pedagogical University

The article is devoted to development of competency-based education pro-

grammeme to train technology and engineering teachers with regard to prospects of light industry development. The developed model includes general and professional competences. The general competences comprise instrumental, interpersonal, systemic, informational, communicative, and legal ones. Professional competences include professional, pedagogical and special competences: engineering and production technology.

**ANALYSIS OF THE CURRICULUM
SUBJECTS CORRELATION**

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The methodological foundation for the analysis of courses dependencies within the university curriculum has been studied. To build an effective curriculum, a model of disciplines correlation analysis based on Spearman's rank correlation using students' assessment as input information was proposed.

**INNOVATIVENESS IN FUTURE
ENGINEERS: VALUE AND
MOTIVATIONAL CHARACTERISTICS**

O.B. Mikhailova
Peoples' Friendship University of Russia

The article presents the results of research concerning the peculiarities of value-motivational structure of engineering students with different levels of innovativeness manifestation.

The obtained data allow introducing new practical technologies aiming at future engineers' motivational activity and innovativeness development.

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**NANOTECHNOLOGY EDUCATION
PROGRAMMES: EXPERIENCE
IN ACCREDITATION**

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The paper presents the results of pilot accreditation of nanotechnology education programmes. The analysis performed allowed revealing a number of challenges in engineering education of Russia and suggesting solutions ensuring its future development and competitive growth of Russian economy in general and professionals, in particular.

**ACCREDITATION OF APPLIED BACHE-
LOR'S EDUCATIONAL PROGRAMMES IN
LITHUANIA**

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versity "LETI"
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National Research Tomsk Polytechnic
University

This article is to some extent a sequel to the notes on organization of accreditation process of Study Programmes in the field of technology in Lithuania [1]. In 2015 one of the article's authors took part in conducting independent external evaluation of 5 Study Programmes of Applied Bachelor level in 4 universities of Lithuania. Together with the earlier publications this material allows to assess the level of development of the system for Study Programmes' (SPs) accreditation and the specifics of its execution in the country.

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**SCIENTOMETRIC RESEARCH RESULTS
FOR EDUCATIONAL TRAJECTORY
DEVELOPMENT IN ELECTRONIC
EDUCATIONAL ENVIRONMENT**

S.V. Kalmykova, E.M. Razinkina
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Polytechnic University
P.N. Pustyl'nik
Herzen State Pedagogical University
of Russia

The higher education system keeps changing; therefore, development of new training methods is currently urgent. Control algorithm designed for the most effective individual educational trajectory is a rather important task. Results of scientometric research allow transformations of the variable part of the curriculum on the basis of modular approach taking into account demands of the most intensively-developing industries. Model formalization of information streams in development of educational trajectories is suggested to choose an optimal option of network interaction.

**TRAINING OF SPECIALISTS USING
NETWORK FORMS OF EDUCATIONAL
PROGRAMMES**

T.Y. Dorohova, A.N. Gribkov
Tambov State Technical University

The article discusses the features of implementing the network forms of educational programme, a functional model of interaction using the network forms of learning, the basic characteristics of the training network forms, their components and tasks are presented. The sequence of training process on the basis of the network of educational programmes and the possibilities of their implementation at the profile departments are considered.

**FUNDAMENTALIZATION OF
TRANSPORT BACHELORS' EDUCATION
WITH THE FORMATION OF
NATURE-CENTERED CONSCIOUSNESS**

V.A. Korchagin, S.A. Lyapin,
Y.N. Rizaeva
Lipetsk State Technical University

The necessity of transforming the entire system of knowledge about the universe, man, society, and the role of the fundamental base in the formation of an organic unity of its natural-science and humanitarian components is considered. The educational paradigm of forming nature-centered ecological consciousness of transport bachelors developed in LSTU is briefly analyzed, the results of its implementation are presented.

**FORMATION AND IMPLEMENTATION OF
UNIVERSITY DEVELOPMENT STRATEGY
AS A FACTOR OF ECONOMIC STABILITY
AND THE EDUCATION QUALITY**

M.M. Krishtal, V.V. Eltsov,
A.V. Komyagin
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Long-term planning of higher educational institutions' activities on the basis of the results of the SWOT analysis is an integral part of the management system and higher education development. Formation and implementation of the development strategy of a university in all spheres of its activities provide the predicted results, both in economics and in the field of education quality. In Togliatti State University "Strategy-2020" was developed and implemented based on five principal parts of its functioning.

VAZ AND HIGHER EDUCATION INSTITUTION: HISTORICAL PARALLELS. EXPERIENCE IN IMPLEMENTING DEVELOPMENT STRATEGY 2020

V.V. Yeltsov, V.G. Doronkin
Togliatti State University

In Togliatti, the automobile plant and the state university were established approximately at the same time and developed simultaneously. Currently, AVTOVAZ development strategy includes the programme of personnel training and retraining. The strategy of Togliatti State University implies development of new engineering education programmes in cooperation with the professionals of the automobile plant. Such programmes will allow developing professional qualities in demand within automotive business sector. With business and education overlapping, it is possible to boost the national economic growth.

BEST PRACTICES OF SIMULATING NEW APPROACHES AND TOOLS FOR ASSESSING REGIONAL DEMAND FOR NEW-GENERATION ENGINEERING WORKFORCE

L.N. Bannikova, L.N. Boronina,
I.I. Sholina
Ural Federal University

In the context of a new paradigm of planning the demand for engineering workforce, the prediction should be formed by each constituent entity of the Russian Federation from the points of view of largest employers and the system of professional education. This stipulates the transition from strict calculation algorithms to a variety of approaches and methods and their free choice. The article discloses the assessment models for evaluation of engineering labor market demand.

HUMANIZATION OF ENGINEERING EDUCATION: CURRENT CHALLENGES IN RUSSIA

T.A. Rubantsova
Siberian Transport University

The paper deals with humanization of today's engineering education and analyzes interconnection between science and education in philosophical perspective. The author investigates different methodological approaches to engineering education, which were applied in Russia before and after the Revolution, in terms of humanization and dehumanization of the society.

AUTOMOTIVE ENGINEER TRAINING: CHALLENGES AND SOLUTIONS

A.M. Ushenin, D.Kh. Valeev,
V.S. Karabtsev
KAMAZ PTC

The paper proves the necessity for using a specific tool in engineer training, namely, mobile training laboratory equipped with all necessary facilities and provided with educational and methodological support. This mobile class will allow solidifying theoretical knowledge and developing the team work skills effective at each stage of product life cycle.

INTERNATIONALIZATION OF HIGHER EDUCATION

O.N. Efremova, O.Yu. Korneva,
I.V. Plotnikova, O.N. Tchaikovskaya,
E.A. Titenko
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Polytechnic University

The paper considers internationalization of higher education associated with the increased number of foreign students in Russian higher education institutions. Education internationalization is proved to be important through the case study of Tomsk Polytechnic University, which is one of the global leaders in the sphere of resource-efficient technologies. The authors have analyzed the specialties mostly chosen by foreign TPU students studying in Russian language.

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INSTITUTE OF ENGINEERING, TECHNOLOGY AND TECHNICAL SCIENCES FOR NEW INDUSTRY

O.I. Rebrin, I.I. Sholina
Ural Federal University named after the first President of Russia B.N.Yeltsin

The present paper considers the Institute of Engineering, Technology and Technical Sciences as an efficient model of university structure to provide engineering education of a new format [1] and develop the education programmes for the next generation engineering and technical personnel [2], [3], [4], [5]. The effects of the model implementation at universities have been described.

VOCATIONAL EDUCATION IN RUSSIA: TOPICALITY, CHALLENGES, AND TRENDS

E.V. Giniyatova, S.V. Dryga
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Polytechnic University

The paper considers challenges and trends in the development of secondary vocational education, which is regarded as an educational resource meeting the demand for skilled trades in the territory of the Russian Federation. The authors have investigated the reasons for the national secondary vocational education being uncompetitive on the global educational services market.

MODERN ENGINEERING EDUCATION IN THE CONTEXT OF THE "INFORMATION BURST"

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Polytechnic University
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National Research Tomsk
State University

Qualitative technological base is being upgraded and innovative technologies are being implemented in many countries of the world. The analysis of basic trends in education sphere proves that

the strategy of e-learning is conditioned by the necessity of improving engineering education, educational process and inevitable globalization of education due to technological and communicational changes.