

«EVERYTHING MUST BE STUDIED AGAIN»

Vladimirov, Yuri, Moscow, Russia.



Review of the book: *The future of engineering education: Collection of scientific articles* / Ed. by A. A. Alexandrov, V. K. Baltyan. Moscow, Bauman MSTU, 2016, 268 p.

ABSTRACT OF THE BOOK

The publication contains topical reports on development of engineering education and inter-university cooperation in the country, the authors of which are representatives of higher educational institutions of different industry profile. A common feature is their belonging to the Association of Technical Universities and the Union of scientific and engineering societies, the successor of the Russian Technical Society, celebrating its 150th anniversary this year.

The collection includes articles on topical issues of engineering education, improvement and renovation of educational and scientific process of training of engineering and scientific personnel, development of integration research and production educational structures in higher education institutions, members of the Association of Technical Universities and working closely with it.

Keywords: *engineering education, scientific and pedagogical schools, inter-university cooperation, connection to production, information technology, scientific and technological progress, development, innovation.*

Selection of this particular collection for review hardly meets the usual journal standards. Still, the very set of scientific articles, even close thematically, is not a reason to claim the analogy with a collective monograph or other research treatise, which contains an easily visible time-demanded task. In other words, the object of our attention in this case, becomes not someone's resulting scientific research work, and a kind of anthology of texts in support for engineering education, which has been losing its positions.

That is the obvious importance of the theme obviously reconciles compilers and reviewers of the collection in relation to «non-traditional» genre of a book, its inconvenience for evaluating advantages and disadvantages of the published material in the initial absence of (by default, without trying to explain something) composition and content integrity.

Let's leave «formal» shortcomings. Let's focus on the merits, the analysis of the essence, for which, in fact, this collection was designed. And before touching the future of engineering education, which is a book about, it would be natural to remember the past, to evaluate the present. This is a normal logic for a researcher – to trace the main stages of development of the

The papers reflect inter-university cooperation and interaction of various scientific and pedagogical schools, practical implementation of the basic principles of engineering education, such as «learning through science», «synthesis of theory and practice», «integration of education, science and production» by leading technical universities.

The publication is designed for a wide range of workers of governing bodies in the field of education, industry, labor and employment, managers of industrial enterprises and organizations, scientific and educational institutions of all levels of engineering and technical education. It may be useful in solving the problems of development of national education systems, improving training and activities of higher education institutions, addressing staffing in various spheres of social production and, above all, for enterprises of high-tech complex at the international level in the framework of the Commonwealth of Independent States.

subject, to give an objective description of its current state, to understand, from what and to what it is necessary to go.

Mentioned in passing in the first paragraph the phrase about engineering education losing its position is still, alas, true, and the collection as a whole does not refute this sad trend for our reality. But returning optimism brings joy, not unfounded, about severe recession in 1990–2000-ies experienced by national higher technical school and serious attempts to return it partially lost credibility with the help of the state.

The collection opens with the article of three authors, including the current rector of Bauman MSTU A. A. Alexandrov, his predecessor I. B. Fedorov and V. E. Medvedev, who are pleased to note that those who under the pretext of easing engineering schools tried to achieve a reduction in their number, terms of training and the number of students failed to implement their plans, and the best Russian technical universities are still at the level of the leading engineering centers in the world [p. 5].

The starting thesis that Russian engineering schools at all times had high quality of training, the authors reinforce with features inherent in our educational system – presence of compatibility

of deep fundamental training of students with a breadth of professional knowledge, compliance of the principle of «learning by science» at all levels. Undoubtedly, the fundamental nature gives education required invariance, but that does not mean that it is necessary to unduly limit the scope of special subjects – without them it is impossible to obtain an engineer, able to conduct creative research in the field of high technology, space technology, microelectronics, nuclear power, where in each particular case, more and more increasing depth of knowledge and understanding are required.

Another equally important aspect is connection of training programs with production, interaction of universities with scientific and production associations, which played an important role in creating the country's network of national research technical universities aimed at making up some reduction in the level of engineering education. Among the reasons for this decline specialists from Bauman MSTU, by the way, call decrease in the quality of school education, deterioration of natural-scientific and mathematical knowledge of future students entering university. Regardless of measures taken through the Ministry of Education, the faculty of Moscow State Technical University started independently to correct the situation by creating a whole system of pre-university work with schoolchildren, and it gains traction [pp. 6–7].

The topic of so-called «non-core» areas in the training of technical university graduates maintains debatable not only in MSTU. And it is not limited to obtaining of management skills by a production engineer or his involvement in the market economy laws. The scale of corporate bonds, mandatory information exchange, competitive speeds in any innovation process are expanding primarily. The notorious globalization exacerbates manufacturing contacts, intellectual property relations, the need to communicate with the international community using common professional language.

On the one hand, the problem of combining knowledge – technical, economic, language, communication, management – is solved through additional educational programs, through which a future engineer prudently, proactively earns his professional competence, but on the other – in the framework of the second higher education those who previously focused on the more universal status, or already have a diploma, but need reinforcement of knowledge in accordance with the changing industry (corporate) situation.

It is unlikely that the very desire for flexibility improves training and makes engineering knowledge deeper. Rather – on the contrary. Just a «comprehensive» educational program with poorly-concealed emphasis on managerialism – it is actually orientation of a graduate to his early exit from the industry consumer niche, and if you like, removal of any dependence on it forever, as well as on the very obtained specialization. And does something here improve directly engineering training, form interest in the case, or (terrible to say!) – dedication to the profession, respect for it?

Considering in the context of practical problems the reform of the Russian education system to comply with European standards (Bologna agreement), representatives of Irkutsk National Research Technical University R. Yu. Lagerev and S. Yu. Lagerev ascertain very significant relevant changes [pp. 11–12]:

- In the professional activity of engineers increasingly important role is played by information and creative factors, there is «intellectualization» of labor;

- Growth of the value of flexible short-term projects, for which it is more profitable to have temporary labor groups instead of permanent staff;

- Disappearance of the concept of stable career development – career, made at one workplace, within one enterprise;

- Interchangeability of performers gives way to personalization of tasks, not uniformity is valued, but versatility of the workforce;

- Identification of traditional forms of labor is lost, seclusion of professional castes breaks down, «floating» borders of professions appear;

- Dynamics and globalization of professions increase, the education system is losing orientation on a single further specialization.

Unambiguity of a conclusion, which is made herewith, is curious: therefore previously developed and implemented to this day educational models, designed primarily for the transfer of theoretical knowledge and professional skills, providing a stable career growth and employment for life, are no longer able to provide engineering training at a level required today. Since Irkutsk authors also refer to another source, from which the idea is probably borrowed, that is reason to believe the made conclusion is typical of certain reformers.

But are the denoted tendencies- factors really so revolutionary? Let's at least not exaggerate, trying to seek artificial arguments to justify own weaknesses.

Is it real that earlier (XIX–XX centuries) for an engineer information and creative factors played, a smaller role and labor not was intelligent? Everything remained the same, we emphasize once, only means, speed, technical equipment meet the requirements of that time. And is it really so, that, on Soviet enterprises, in design bureaus temporary (targeted) labor collectives were not created? And where have you seen a career at a single workplace or necessarily on the same enterprise? (Well, do not take into account the extreme forms of the Japanese type, when the work was inherited within the family). Besides, why should interchangeability of performers exclude personalization of tasks and vice versa? And then why the principle of basic specialization in engineering education is suddenly called into question? Does it obviously deny the right of any improvement?

It is much easier. Preserving approaches, which are natural for the profession, technical university is obliged to comply with the progress, and in some ways to be ahead of it. Of course, the dynamics of change applies equally to forms, content of training and methods of organization



of engineering labor in the production. However, it is important for major landmarks in the educational programs not to conflict with each other and not to be mutually exclusive.

Dissatisfaction with the current state of engineering education system and the overall reform of the university sphere is largely present in many articles of the collection. In particular, this refers to the reports of colleagues from Rostov State Transport University – one of the largest among transport universities. It is not a secret, N. G. Dyurgerov and Yu. V. Baskakov note, that the level of school knowledge of 1st year students who want to become engineers, reduces, including in mathematics and physics. General cultural training decreases also. And what are doing the reformers? Ignoring the traditions established in the country, they give priority to the western educational schemes. Plausible excuse – to achieve recognition of the qualifications of graduates of Russian universities abroad for their employment opportunities in Europe and the United States. That is, in fact, option for legalization of «brain drain» was made easier in conjunction with the transition to the Bologna structure of Bachelor / Master. Fortunately it was managed to avoid in technical universities total transition to a two-tier scheme, the arguments were accepted by authorities, and even the first few years have shown the correctness of conservation of engineering specialist degree at least in the current proportions [pp. 21–23].

A certain mismatch between learning objectives and content of training programs with multi-level processes is covered in the article of E. Yu. Fedorov and G. S. Khairullina (Kazan National Research Technical University named after A. N. Tupolev – KAI). Training of students, in their opinion, in some areas does not meet expectations – say, activity of an engineer involves inevitable integration of its individual aspects, and curriculum of a bachelor, on the contrary, is differentiated by cycles and disciplines, without providing proper concentration of knowledge, skills and required competences. Moreover, interdisciplinary communication are disclosed implicitly, academic subjects are taught in isolation from each other, there is lack of fundamentality, of development of system thinking of a future university graduate [pp. 102–103].

The situation arisen in the country is rigidly assessed in Admiral Makarov State University of Maritime and Inland Shipping (St. Petersburg). As S. O. Baryshnikov and A. L. Stepanov note, at the initial stage of the new economy education costs did not meet the set goals, but because of the lack of a full-fledged production a serious need for specialists has disappeared. The first graduates of bachelor's programs received the diploma «to save civilization» and are waiting out the time in their master's studies. For such a

specialist engineer labor-intensive academic work is shortened, the thesis project is simplified. Another option is demanded less: lower level – Bachelor technologist-maintainer, and the upper – Master Manager (more expensive in costs, which usually cannot be afforded) [pp. 114–115].

Not only in relation to this situation, where neighbors are lack of funds for reorganization of the training system, and the lack of order for engineers from port communities and shipping companies, but above all in the attempts to find some universal solution – participants in these «part-time» discussions often coincide in one thing: in all cases at least a system of sectoral planning, training and distribution of engineering personnel is required. Then the costs of education will naturally be related to the needs for targeted use of specialists. And anyone can easily add his own «particular» into this principal constituted module.

For example, calls of N. I. Sidnyaev (Bauman MSTU) to strengthen the role of master's studies and professional retraining, as well as systematic and regular increases in engineering skills, are true. It is the master's studies, he believes, that are able to solve the problem of advanced training for use of advanced high technologies in production [p. 221].

The opportunity to consider the prospects for consolidation of efforts through the «educational-production tandem» (factory-technical college) in the context of continuing education ideas (secondary professional education – Bachelor's studies – Master's studies – Ph. D. studies – further vocational education) is also reasonable – it is a topic of M. L. Isaev and N. V. Nikulina of Northern (Arctic) Federal University [p. 62–69]. Similar problem are considered by a group of authors of Bryansk State Technical University and Karacharovsky plant «Electrodetail», they consistently analyze interdependencies and challenges in education and research cooperation of manufacturers and university employees, including the task of finish learning of bachelors to a level where they will be able to carry out a role of designer or technologist [pp. 69–76].

The topics mentioned in the review also indicate in general a range of issues on engineering education and its future, which are interesting for the university world. And here there is a reason to once again turn to the text of the collection, which quoted academician V. I. Vernadsky: «the history of scientific thought... can never give a final unchanging picture, actually transmitting the actual course of events, and each new generation should re-study it» [p. 161].

Future is transient, as time at all. I will tell a rebellious thing in conclusion: the future, which was assumed in the collection of the articles has already come. The university should proactively work non-stop. Even seemingly familiar and old – think over the words of Vernadsky – requires once at any time new thinking. ●

Information about the author:

Vladimirov, Yuri V. – Ph.D., +7 (495) 684-28-77, Moscow, Russia.