

Public-Professional Accreditation – Effective Tool in Improving Education Programs. Experience of Tomsk Polytechnic University

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The article presents the analysis of AEER expert committee reports which describe public-professional accreditation of educational programs in Tomsk Polytechnic University from 2003 to 2012. The special focus is made on the changes initiated by University to meet AEER accreditation criteria. Based only on the data presented in the expert committee reports, the opinion about university policy in development and implementation of educational programs, as well as systemic error probability and obvious university benefits has been issued. The main purpose is to draw attention of higher education institutions to the importance of being accredited by public-professional organizations and the necessity to conduct continuous monitoring of expert committee reports as a valid indicator of university performance. Our experience and recommendations could be of great importance for those who are planning to undergo public-professional accreditation.

The achievements of Tomsk Polytechnic University (TPU) clearly demonstrate its determination to become one of the world's top universities.

In 2006, TPU was awarded the RF Government Quality Management Prize. In 2007 the university became the winner of innovative educational programs competition in the framework of Priority National Project "Education". In 2009, it received the status of

National Research University. TPU is currently among the candidates for the status of Leading Research University.

RF Government Prizes, victories in various competitions, status of National Research University – all this is the result of consistent work in quality assurance and enhancement in all areas of University activities.

Continuous quality enhancement of educational programs is of special

attention in TPU. The positive effect of independent assessment is the subject of wide speculation. A widely shared view that public-professional accreditation is one of the most effective tools in improving engineering educational programs is beyond question.

TPU has a vast experience in accrediting educational programs (more than 50) in national and foreign accreditation agencies. The quality of educational programs offered by TPU were accredited by such organizations as Independent Accreditation Center for Engineering and Technology, Russia (IACET), Canadian Engineering Accreditation Board, Canada (CEAB), Accreditation Board for Engineering and Technology, USA (ABET), Association for Engineering Education of Russia (AEER).

The first experience in the accreditation of educational programs in engineering and technology in Tomsk Polytechnic University dated 1996, when five educational programs for graduate-specialists were accredited. This accreditation was conducted by the Independent Accreditation Center (IAC), which was based on the self-developed criteria.

The cooperation of TPU with AEER, especially in educational program quality assurance, was proved to be the most productive and longstanding.

During the past 10 years basic and repeated public-professional accreditation procedures of 43 education programs in engineering and technology were initiated in AEER. More than 20 AEER expert committees visited TPU including participating countries of European Network for Accreditation of Engineering Education and Washington Accord.

On the basis of the audit results, expert committee prepared evaluation reports including collegial and individual recommendations, identification of strengths and weaknesses of each educational program. These reports were analyzed by University authority; corresponding corrective action plans were developed. The gained experience has become of great importance in

further professional-public accreditation of educational programs.

TPU has acquired enormous experience which can be of great importance for those universities which are planning to submit educational programs in the field of engineering and technology for public-professional accreditation. The conducted research has revealed that accreditation results of educational programs can be used not only as an indicator of teaching quality, but also as one of the indicators of university efficiency, as a whole.

The comparative review of expert committee reports which describe the public-professional accreditation of educational programs in Tomsk Polytechnic University from 2003 to 2012 is presented below. For the sake of convenience, the information is structured in accordance with criteria – in this case the changes in various university activities become more obvious.

In 2003, TPU was one of the six universities which took part in AEER “pilot” accreditation of educational programs in the field of engineering and technology [1]. The TPU pilot project included accreditation of Bachelor Degree Program 552800 “IT and Computer Science” and 551300 “Electrical Engineering, Electromechanics, Electrotechnics”.

The educational program (curriculum) was evaluated in accordance with the following 8 criteria:

1. Program curriculum
2. Quality
3. Faculty
4. Professional component
5. Facilities
6. Information infrastructure
7. Financial support
8. Graduates

The educational programs submitted for accreditation were highly appraised in terms of “Curriculum Content”. The strengths of these programs involved such facts as efficient mechanism in attaining the program

educational objectives, solid student outcomes in Sciences and Mathematics, core professional courses and profile professional courses, advanced courses in English and economics.

According to committee decision, the weakness of these programs included insufficient understanding of ethic, socio-political and ecological aspects and the recommendation was to provide and consider these issues within specific courses and in graduate qualification papers. The Commission also highlighted the fact that RF enterprises are not fully interested in Bachelor degree graduates and obviously prefer graduate-specialists.

The EUR-ACE Project aimed at setting up a coordinated European system for engineering education accreditation within the Bologna process was being implemented in 2004-2006 [2]. Russia was represented by AEER in this project. EUR-ACE Framework Standards for Accreditation of Engineering Programs were developed as a part of the project [3].

TPU also took part in pilot accreditation projects in accordance with AEER criteria which were revised based on international standards. In 2007, AEER gained the right to assign the European "quality label"-EUR-ACE label-subsequent to the accreditation results of engineering educational programs. Since that time, all educational programs offered by TPU have been audited for compliance with international standards.

The list of AEER criteria [4]:

The educational program (curriculum) was assessed in accordance to the following 9 criteria:

1. Program educational objectives
2. Program content
3. Students and study process
4. Faculty
5. Professional qualification
6. Facilities
7. Information infrastructures
8. Finance and management
9. Graduates

Listed below are the most frequent recommendations of expert commissions.

Criterion 1. Program educational objectives

Criterion requirements: The Program objectives should be consistent with the state education standards and meet the needs of constituencies. In this case, they should be precisely formulated and documented.

As a rule, this criterion is evaluated positively. However, there were cases when it was recommended to upgrade the mechanism for achieving and amending the objectives, updating the educational program (curriculum) itself through continuous monitoring of the needs of potential constituencies.

Criterion 2. Program curriculum

Criterion requirements: Program curriculum should include not less than ECTS 300 credits for specialist training programs, not less than ECTS 240 credits for Bachelor degree programs and not less than ECTS 120 credits for Master degree programs. Program curriculum should be consistent with the objectives and prepare students to attain learning outcomes.

It is one of the most illustrative criteria. In 2004-2010 the requirements of both the Ministry of Education and Science and AEER significantly differ. This is precisely why both commissions highlighted such facts as specified irrelevance of the indexes and curriculum hours of some courses to those hours stated in State Education Standard of Higher Professional Education, RF, modification of course-hour ratios. As all above-mentioned factors are relevant to the University standard itself, particular recommendations to exclude the existing situation were not stated.

In some aspects, the criterion requirements to ensure competencies in economic, ethic, socio-political, ecological issues, as well as, in labor safety and sustainable development are otherwise. Practically all commission members recommended making

provision for above-mentioned factors in graduate qualification and term papers. However, there is no significant modification of this requirement implementation in the University.

At the same time, there is an obvious increase in the number of requirements of this criterion, which in its turn, made it possible to underline the strengths of such accredited program curricula, i.e. availability of individual student tasks, study manuals assigned by Education and Methodic Association (EMA) in classical University education (MSU), application of sophisticated teaching technologies and student participation in industrial activities from the second University year.

Criterion 3. Students and study process

Criterion requirements: The academic process should ensure that each student attains those learning outcomes consistent with program education objectives. Students should have internship opportunities in different enterprises and participation possibilities in academic mobility programs.

Traditionally, there are practically no comments and recommendations in respect to this criterion. Well-established and concise procedure of testing, additional educational programs and "compensation" courses for students with inadequate basic knowledge-level have been positively evaluated. The strengths of these education programs are (1) obligatory student internships in the second University year, involving practical task implementation, which include internship in different regional enterprises; (2) close academic and research interaction between departments and Institutes within the former Soviet Union and abroad (Kazakhstan, France, Czech Republic, Germany, Mongolia, China and other countries) which provide academic exchanges within the framework of the education program.

The most "weak point" in the criterion evaluation of the program is the provision of academic mobility. It is a

known fact that the existing regulations and financial policy of a funded institution little do develop this aspect of the education program.

Nevertheless, report analysis indicated a positive dynamic concerning this question. While in 2004, there existed practically an epizoic student academic exchange and the recommendation was "systematize the activities in academic mobility through advanced development plan of practical training and internship in other institutes and universities, today, since 2010, academic mobility has become an integrated part of this or that education program and has been evaluated as a "strength". Until up to now, the recommendation remains "intensive scaling of student academic mobility, not only in domestic institutes, but also abroad".

Criterion 4. Faculty

Criterion requirements: The faculty should have a high qualification level, participate in R&D projects, and understand the role of his /her course in respect to the professional development of a specialist.

Tomsk Polytechnic University is proud of its faculty members, which, in its turn, has been unambiguously verified and emphasized in the reports of accreditation commissions. This criterion indicates "those tendencies and modifications in the education policy of a particular university and state in general."

In this case, in 2004, there were the following commentaries: "there are no instructors with academic degrees or ranks in those departments that are involved in foreign language teaching, physical training and military training..., ...The University should eliminate this gap..." or "...young instructors without teaching experience and no professional development in teaching methods are engaged in the program implementation..."; however, in the period from 2005 to 2009 this gap disappeared and the existing programs

were relevant to the above-mentioned criterion.

For example, from 2010 the situation shifted. The typical commentary of expert commissions was the fact that there are so few instructors with doctor degrees who are engaged in the implementation of the education program.

In this case, the strengths of the education programs included no turnover in staff, practice experience in different spheres and active participation of the faculty in R&D projects.

Criterion 5. Professional qualifications

Criterion requirements: The program should provide engineering training during the study period. The graduates should attain competent knowledge in engineering disciplines, skills in engineering analysis, project management and etc.

This criterion is evaluated in accordance to great number of aspects and is usually distinguished by positive evaluation. However, in this case, there are weaknesses which could be only system gaps, but not the drawbacks of this or that program

One of the typical criterion requirements is the following expert commission conclusion " although the student's have knowledge in economic, ethic, socio-political, ecological issues, as well as, in labor safety and sustainable development, they do not apply this in their term papers and projects." In this case, it is recommended "to include these aspects in guidelines and instructions for term papers, projects and graduate qualification papers".

Typical recommendations of commissions embrace such an item as the development of teamwork skills in interdisciplinary topics, including the implementation of integrated team projects and graduate qualification papers and further evidence showing the student's abilities in pursuing professional engineering ethic code and norms, as well as, his / her responsibility to different engineering activities.

Student R&D activities is one of the most significant advantages of TPU and is consistently being evaluated by experts as a education program strength of the University in general.

Until strength of the TPU education program was the advanced training level in English for specific purposes.

Criterion 6. Facilities

Criterion requirements: The program's facilities should be relevant to licensing indexes, upgraded and appropriate to program educational objectives. The program should ensure that the facilities are consistently being upgraded and developing.

In 2004–2007 the expert commissions recommended the need to purchase upgraded analytical equipment and the establishment of university focused labs to maintain R&D activities.

After 2007 this criterion was highly evaluated by the experts. As a rule, the strength of education programs is the fact that the facilities include sophisticated domestic and foreign equipment and domestic software.

Criterion 7. Information infrastructures

Criterion requirements: Adequacy of computer resources support the attainment of program educational objectives and should be consistently upgraded and developed.

This criterion is usually positively evaluated by expert commissions. Many faculty members recommend required books out of 40–50 years in their course descriptions (annotations), while the adequacy of TPU library is relative to the needs of the program and faculty. In this case, the standard recommendation of expert commissions is the capability of the library to serve the program by obtaining modern courseware, domestic electronic education resources, including foreign ones.

Criterion 8. Finance and management

Criterion requirements: The financial support for the program should be relevant to licensing indexes. Financial and administrative policy should be adequate to ensure the quality and continuity of the program.

This criterion is usually positively evaluated by expert commissions. From time to time, if there are recommendations, they involve only Quality Management System (QMS), i.e. procedures in the upgrading of the University standard. One example recommendation was to specify the University program period and the annual procedure of its revision and approval.

Criterion 9. Graduates

Criterion requirements: Employment system and support of graduate careers should be involved in the continuous improvement of the program.

This criterion shows distinct positive dynamics. In 2004 it was recommended "...to develop a system of annual questionnaires for graduates within the framework of QMS..", while in 2007 it was noted "... components for education program improvement are confirmed by graduate feedback."

During the past few years strength of the education programs is the existing well-established employment system. This fact shows that the number of employment applications is significantly more than the number of graduates, which, in its turn, provides job placement for all graduates. The introduction of an employee placement system (EPS) of on-site training and research internship for future student specialists enables employers to evaluate the training quality of specialists and establishes long-term mutually beneficial cooperation with Universities.

Based on the conducted research, it is possible to draw the following conclusions about university policy in

development and implementation of educational programs:

1. Educational programs are developed and implemented in compliance with the needs and requirements of program constituents.

2. Program curriculum always aligns with the Degree Program educational objectives and supports the attainment of the student outcomes. The succession and the content of each course within the curriculum is thoroughly analyzed and defined in order to secure shaping of this or that students' professional competences. It is achieved through the application of vast amount of corresponding courseware including study manuals recommended by Education and Methodics Association and student assignment packages, contemporary teaching technologies, tools and equipment, as well as involvement of highly-qualified faculty members who are actively engaged in science and research. To secure continuous education quality enhancement, a number of regulative documents and University standards have been developed.

3. Cooperation with potential employers allows university to revise and modernize the existing curricula including student outcomes and program objectives in order to support the attainment of the required student professional competences acquired during internship and practice, which in its turn secures great demand of university graduates.

The analysis of the expert committee recommendations on the correspondence of educational program to the criterion requirements has revealed that the recommendations can be divided into two groups.

The first group reflects the current trends in Russia. A great number of aspects which are common place in international practice can be hardly implemented in Russian higher educational institutions due to the following reasons: economic, political, legitimacy gap in RF legislation system and etc. It concerns academic mobility

assurance, student team work on interdisciplinary subjects including course papers and final qualification projects, etc.

The second group embraces the problems which can be solved by the university itself. They are as follows: increasing the number of doctoral degree holders, developing the code of professional ethics and regulations of engineering activity; covering economic, ethic, social-political, ecological and

safety issues in course paper and final graduation project fulfillment, providing technical and informative support for various educational program implementation.

It is evident that public-professional accreditation is proved to be a real tool in assessing university performance. Effective application of this tool can help university to reveal its weaknesses and strengths, systemic errors and benefits.

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