Assessment of the quality of training of specialists in higher education institutions

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Abstract. The article presents the requirements and various ways to assess the quality of educational services and training of specialists in higher education institutions, and also offers a “comprehensive” indicator of the quality of management systems that takes into account the main results of educational activities of the University – the degree of development of educational programs by students and satisfaction of the main consumers of educational services.

1. Introduction
The introduction of a new generation of Federal state educational standards (FSES) has set the task for higher education organizations (HEOS) to create systems for internal and external assessment of the quality of educational activities and training of students.

The analysis of the Federal state educational standards regulating the implementation of basic professional educational programs (PSE) aimed at training specialists in the field of fire and technosphere safety [1-4] showed that the main requirements for the assessment mechanisms used are:

1) regularity of the assessment;
2) the main participants in the assessment are students;
3) involvement of future (or currently known) employers in the assessment;
4) conducting an assessment with the involvement of teaching staff of the public organization of higher education
5) mandatory nature of internal assessment;
6) voluntary nature of external evaluation.

2. Requirements set by the standards
The requirements set by Federal standards (FSES) are not new for those higher education organizations that have implemented and effectively operate a quality management system that meets the requirements of international standards ISO 9000 series [5, 6]. Analyzing the existing experience in assessing the quality of educational services provided [7, 8], as well as external evaluation mechanisms implemented in the practice of higher education organizations, the Ural Institute of GPS of the EMERCOM of Russia within the framework of the developed management system for training...
specialists (SUPS) takes into account the following methods for assessing the quality of educational services and training of specialists:

1) Procedure for state accreditation of educational programs implemented in order to confirm their compliance with the requirements established in the Federal state educational standard;

2) Licensing of new educational programs for expanding the market of educational services provided and training specialists in other fields, as well as adding new places of educational activities to the Appendix to the license (if necessary);

3) Public and professional-public accreditation confirming that the quality of educational programs implemented meets the requirements of potential employers and the labor market;

4) External audits of existing quality management systems to confirm their suitability and effectiveness, as well as to assess the adequacy of existing feedback mechanisms and the commitment of higher education organizations to the basic principles of quality management;

5) "Standard" mechanisms for assessing the quality of training of students: boundary control, intermediate certification and final (state final) certification;

6) Conducting internal audits of the activities of structural divisions of higher education organizations in order to determine whether the requirements for their activities are met, as well as whether the planned quality indicators of their activities have been achieved;

7) The self-activities of institutions of higher education to assess its strengths and weaknesses and plan activities to address identified deficiencies, or to avoid the possibility of inconsistencies in various aspects of the business future;

8) Organization of feedback with the main consumers of educational services:
   - students (of all forms of education) in the educational programs implemented in the public educational institution;
   - graduates of the public educational institution (not earlier than six months after completion of training);
   - employers (when graduates are employed "in the specialty");
   - faculty of the public organization of higher education;
   - as well as generalization and analysis of requests and offers from other categories of consumers of educational services (parents, Executive authorities, the founder of the public organization of higher education, and others).

Basic criteria for evaluating activities of educational organizations in established in the regulatory legal acts of the Ministry of education and science governing the conduct of the self-evaluation of educational organization [5, 6]. As indicators to assess the quality of the conditions of realization of educational activity IN the OO may be used figures in the order of the Ministry of education and science of the Russian Federation from 15.04.2019 No. 30N [9]. However, the rating on the proposed criteria does not allow to assess the dynamics of control system of educational organizations in the necessary unification of competences [10]. At the same time, the criteria should be based on the rating "Three missions of the University" [11].

Thus, we believe it is necessary to enter the complex index of quality of functioning of SUPS that will allow you to assess the quality of training in educational organizations in EMERCOM of Russia taking into account the main influencing factors identified in the assessment process areas for improvement activities.

The complex quality indicator is proposed to be calculated using the following formula:

$$K = 0.3 \cdot R_1 + 0.5 \cdot R_2 + 0.2 \cdot R_3$$  \hspace{1cm} (1)$$

where R1 is an assessment of the results of mastering the opop OO by students. Takes into account the objective results of training based on the results of intermediate and final (state final) attestations;

R2-assessment of satisfaction of graduates and their employers with the quality of professional training. The opinion of only those graduates who are employed in their specialty, as well as their direct supervisors, is taken into account;
R3-assessment of students’ satisfaction with the quality of educational services provided. It takes into account the opinion of all students on the OPOP implemented in the OO (from the first to final courses).

The R1 indicator is calculated using the following formula:

$$R_1 = \frac{PA + GIA + WRC}{3}$$  \hspace{1cm} (2)

where PA is the percentage of students certified as "excellent" and "good" by the results of intermediate attestations. This indicator is calculated based on the results of each session without taking into account retakes;

GIA – the percentage of graduates who were certified "excellent" and "good" in all studied disciplines(modules), practices at the time of admission to the final (state final) certification;

WRC – the percentage of graduates who defended their final qualifying work with "excellent".

When calculating indicators R2 and R3, the number of responses received from consumers of educational services is taken into account, and the formulas for calculating them depend on the representativeness of the sample obtained.

We calculate the required number of received questionnaires using the following formula:

$$n_n = \frac{z^2 pqN}{\Delta^2 N + z^2 pq}$$  \hspace{1cm} (3)

where \( z \) is the normalized deviation;

\( p \) is the found variation for the sample;

\( q = (100 - p) \);

\( N \) – the size of the population for the analyzed period. Accepted as equal to the number of students (No), graduates (NB) or their employers (NR), respectively;

\( \Delta \) – acceptable error.

If the number of received questionnaires (PF) is more than necessary, the indicators R2 and R3 are calculated as follows:

$$R_2 = \left( \frac{A_1 + A_2}{2 N_o} \right) \cdot 100\%$$  \hspace{1cm} (4)

$$R_3 = \frac{A_3}{N_o} \cdot 100\%$$  \hspace{1cm} (5)

where \( A_1 \) is the number of graduates of OO HE who assess the level of knowledge obtained on "good" and "excellent";

\( A_2 \) – the number of direct managers of graduates who are fully satisfied with their competence;

\( A_3 \) – the number of students who rated the quality of educational services as "good" and "excellent".

Under the condition PF PN, the indices of R2 and R3 is calculated as follows:

$$R_2 = \frac{A_3}{N_o} \left( \frac{A_1 + A_2}{2} \right) \cdot 100\%$$  \hspace{1cm} (6)

$$R_3 = \frac{A_3}{N_o} \cdot \frac{A_1}{N_o} \cdot 100\%$$  \hspace{1cm} (7)
where $A_{\Sigma}$ is the number of applications received from students, graduates, or their employers, respectively;
$N_{\Sigma}$ - is assumed to be equal to the number of students (No), graduates (NB), or their employers (NR), respectively.

3. Conclusion
Assessment of a complex indicator of quality of training of specialists in the Ural Institute of state fire service of EMERCOM of Russia proposed formulas held for the first time the results of the 2019-2020 academic year, and totaled in the final value of 73%. During the evaluation and analysis of the results obtained, possible alternatives for calculating the complex indicator were identified; for example, there is a significant negative impact on the final value of student performance indicators calculated without taking into account retakes, as well as the lack of accounting for the results of the state exam (if it is available in the implemented opop).

The next stage in the development of the SUPS is to study the main internal and external factors of the PO HE that have the greatest impact on the quality of training in the PO HE EMERCOM of Russia, as well as the possibility of taking them into account and pilot testing of the introduced complex quality indicator.

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