

The Model of Quality Assessment of a Scientific and Educational Network Performance

Oksana N. Tkacheva^a, Marina V. Simonova^b and Yuriy V. Matveev^b

^aRussian State Vocational Pedagogical University, RUSSIA; ^bSamara State University of Economics, RUSSIA

ABSTRACT

The relevance of the studied problem is caused by the fact that now the creation need of transparent and objective models and mechanisms of educational quality assessment of the organizations with participation of professional communities, public organizations, and other interested parties is realized. The purpose of the publication consists in the model development of quality assessment of scientific and educational network performance in the form of external audit. The system approach connected with representation, studying and designing of object as systems, sets of its interconnected structural and functional components, including in relation to research of the pedagogical phenomena and systems acts as the leading approach to research of this problem. The model of quality assessment of the scientific and educational network performance in the form of external audit is presented. Materials of the article can be useful while carrying out an independent assessment of current state and dynamics definition of the development of participants' activity of network interaction (conditions, processes, results).

KEYWORDS

Audit of the organizations of a scientific and educational network; external audit; quality assessment of educational activity (organization operation or performance)

ARTICLE HISTORY

Received 09 April 2016
Revised 30 June 2016
Accepted 06 July 2016

Introduction

The strategic task of the state educational policy consists in creation of the system of an independent quality assessment of education taking into account the principles of openness, objectivity, transparency, professional and public participation. One of the directions of the created system is an independent assessment of the educational organizations operation in the conditions of a network interaction. This direction assumes forming of mechanisms educational quality assessment with participation of representatives of professional

CORRESPONDENCE Oksana N. Tkacheva ✉ oksana.tkacheva@rsvpu.ru

© 2016 Tkacheva, Simonova & Matveev. Open Access terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>) apply. The license permits unrestricted use, distribution, and reproduction in any medium, on the condition that users give exact credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if they made any changes.

communities, public organizations and other concerned parties in expert procedures.

Now there are three primary groups of characteristics of education quality highlighted in the Russian scientific and academic literature: potential quality of goal achievement of education, process quality of education and result quality of education:

potential quality is expressed in such characteristics as quality of the purpose of education, quality of the educational standard, quality of an educational program, quality of material and technical resources of an educational process, quality of teaching structure, quality of information and methodical base, student quality;

process quality represents quality of technologies of education, control and assessment, motivation of the teaching staff on creativity and efficiency of pedagogical work, the students' attitude to education, intensity of educational process, management efficiency;

result quality of education is understanding, recognition and implementation of individual capabilities and features, mastering methods, methodology of self-education, knowledge and practical skills (Bolotov & Efremova, 2007; Korotkov, 2007).

The research of quality change of educational institutions performance in case of their consolidation in scientific and educational networks is of special interest. The scientific and educational network is understood as "a dynamic multitude of the interconnected agents representing the scientific, educational, social, cultural organizations (their subdivision, creative teams), and also elements of innovative infrastructure and industrial enterprises interested in educational development that performs to be a virtual organization and carries out innovative projects in education at the high level of coordination of the purposes and integration of all types of resources. The results are reached by means of forming and developing internal information space of the scientific and educational network providing the creation of collective objects of intellectual property in education and increasing in external effects" (Fedorov & Davydova, 2014).

It is known that the network partnership on the basis of integration creates the following factors of progress:

- lack of physical restraints of growth;
- fast diffusion and assimilation of knowledge;
- creation of new knowledge and new tools;
- ensuring own identity of network partnership;
- joint management of collective knowledge;
- maximum opportunities for assimilation of the most innovative valuable implicit (hidden) knowledge (tacit knowledge) which is not formalized and it cannot be acquired by a traditional method (broadcasting, codification, digitization, preservation) (Dmitrieva, 2015; Silkina & Vaganova, 2015).

The analysis of the researches in the field of educational quality assessment makes possible to reveal the main purpose of educational quality assessment of institutions - members of the scientific and educational network:

- diagnostics implementation of a current status of educational activities of members of the scientific and educational network;
- implementation in the participating organizations of a network interaction of processes of continuous improvement of educational activities due to identification of problem points and discrepancies in activities;
- start of innovative development by means of the new areas of improvement and development of educational activities found during estimative procedures;
- guarantee the openness of activities of the scientific and educational network and expansion of direct participation of professional communities, the public in educational management process.
- forming of expert community interested in the development of specific organizations of the network members;
- development of assessment competences among members in the field of evaluative procedures;
- education quality improvement in the conditions of a network interaction (Dorozhkin & Davydova, 2013).

Consequently, educational quality assessment of activities of the educational organizations of the scientific and educational network can be considered as a systemically important element of development processes both of certain participants of network interaction and the scientific and also educational network in general; and must be considered as the response to some downsides found in specialists' work activities. Russian State Vocational Pedagogical University together with the Russian Academy of Education conducts such work in this direction about 10 years. This research is devoted to the studying of ways of forming of organizational and pedagogical model of providing quality assessment of organization activity of the scientific and educational network in the form of external audit.

Materials and Methods

Research methods

The system and process approaches to quality assessment of the scientific and educational network operation are used; which in total create a complete idea of possible essence of audit of quality of network operation. The system approach is connected with representation, studying and designing the object as a system, sets of its interconnected structural and functional components, which includes the pedagogical phenomena and systems applied in the research (Zagvyazinsky, Zakirova & Strokova, 2008). The process approach considers the solution of pedagogical problems from the point of view of the process representing a set of the necessary types of activity (Potashnik, 2002). These approaches allow us to develop the model of quality assessment of educational activities, in the form of audit; to determine the necessary list of indicators and to develop the criteria of these activities, also to consider the main diagnostic methods.

In the course of the presented research the following theoretical methods were widely used: the analysis; synthesis; specifications; generalization; analogies; modeling; diagnostic methods - questioning; interviewing; empirical methods - studying of a work experience of the educational organizations,

regulating and educational and methodical documentation; pedagogical supervision; the experimental methods - stating, creating and control experiments; methods of mathematical statistics and graphic representation of results.

The method representing the determination of essential indicators of operation of any organization is generally thought to be the method of balanced indicators for measure of organizational activity (area of the main indicators) wherein four components can be found: financial which reflects ultimate goals of a value addition of the equity of a network in general and the constituting organizations in particular; client-based — reflects marketing characteristics of the organization; the component of internal business processes reflecting parameters of efficiency of the core business and the constituent of personnel development and innovative processes (Kaplan & Norton, 2008).

The analysis of the researches in the field of education quality assessment has allowed to allocate a number of ideas and developments which can be used for quality assessment performance of the organizations of the scientific and educational network:

- diagnostic assessment focused on a zone proximal development of the concrete organization;
- attraction to carrying out the quality assessment procedures of institutes of civil society;
- forms of the organization of public quality education examination and public accreditation of educational organizations.

Experimental base of research

Russian State Vocational Pedagogical University was the experimental base of the research, about 70 general educational organizations and 5 organizations of the system of vocational education.

Investigation phases

On the basis of system and process approaches, the purpose of modeling consists in development of the model of external audit of quality of organization activity of the scientific and educational network which would be brought closer to reality, reflect important components of external audit, communication, processes, tendencies, and also meet the modern quality requirements of education and its assessment on the part of the state, professional communities, consumers of educational services, public representatives.

The second phase of modeling is the analysis of the known characteristics and signs of object of modeling - external audit. To develop the model, we have studied and specified the essence and characteristics of external audit; its features, the basic principles of the organization and conduct, functions, audit methods; types of audit procedures, technology, tools of external audit are defined more exactly.

The third phase of modeling - identifying of essential components, elements and signs of external audit from the point of view of the modeling purposes. For creation of the model, actual process is considered to be allocation of essential components, elements and signs of audit from the point of view of the purposes of modeling; detection of optimum set of the components of audit providing

efficiency of model, and also establishment of communications between components based on this model. This phase of modeling has special value; the adequacy of model (i.e. compliance to the created model) depends on the fact how clearly and fully essential components and its features were defined by us.

Results

It is known that the process of modeling is one of effective methods of scientific knowledge and serves as the theoretical basis for experimental work in the course of scientific researches. In our case, the purpose of modeling is the development of the specific model of carrying out external audit of the organizations of the scientific and educational network which would reflect its essential components, communications and processes, and also meet the modern quality requirements of education and its assessment on the part of state, professional communities, consumers of educational services, public representatives.

In the course of the model creation we have distinguished the following systemically important and interconnected components (Figure 1):

- target component, directed to determination of degree of activity compliance of participants of the scientific and educational network with the established criteria and drawing up recommendations for corrective actions and offers on a further improvement of network activities;

- organizational component which includes the principles, functions, subjects, objects, scope, methods, requirements, tools, etc.;

- resource component, providing regulatory, organizational and methodical, informational, material and technical, personnel and financial support of quality control of organization activity in the conditions of the scientific and educational network;

- technological component discloses evaluation stages of quality of activities of participants of network interaction: initiation of external audit of organization activity quality of the scientific and educational network; planning of external audit; organization of preparatory audit procedures; process of audit of educational activities quality; completion of external audit;

- productive component represents conclusions about degree of compliance of activities of participants of network interaction with the established criteria, recommendations about corrective actions; proposals on the performance development of the scientific and educational network;

- control and reflexive component is aimed at providing processes of continuous quality improvement and reliability of the system of external audit.

- control and reflexive component is aimed at providing processes of continuous quality improvement and reliability of the system of external audit.

Target component

Determination of the degree of activity compliance of participants of the scientific and educational network with the established criteria.
Recommendations on development of work streams of participants within a network interaction.

Organizational component

The principles, functions, subjects and objects of quality assessment of activities in the form of external audit.
Methods, tools, fixation and registration of audit records.

Recourse component

Regulatory support; organizational and methodical support; informational support; material and technical support; personnel support; financial support of the quality assessment of organization activity of the scientific and educational network members in the form of external audit.

Technological component

Initiation of the quality assessment process

- decision of customers on carrying out the quality assessment of the organization network performance;
- conclusion of agreements with an independent expert organization about the quality assessment of participants' activities of network interaction by means of external audit.

Planning of the quality assessment process

- development of the external audit program of the quality of the network organization;
 - development of tools;
 - choice of methods of external audit;
 - determination of types of audit records;
 - forming of requirements to auditors.

Organization and carrying out the audit procedures:

- forming of auditor groups;
- implementation of preparatory procedures of external audit;
- acquaintance with activities of participants of network interaction;
 - conduct of meetings of the parties of external audit;
- collection, verification, assessment of data regarding the criteria of external audit;
- composition of conclusions, preparation of the conclusions on external audit.

Completion of external audit

Preparation of audit reports; approval of reports; mailing of reports.

Productive component

Conclusions on external audit; recommendations: on the correcting actions; on the warning actions; suggestions for improvement and development of activity of the scientific and educational network; the actions in the organizations of the scientific and educational network by the results of external audit directed to correction, improvement, development of activity of participants of network interaction.

Control and reflexive component

Quality of conduct of external audit. Quality of results of external audit;
satisfaction of customers of external audit and audited party with the work
quality of auditor group.

Figure 1. The model of quality assessment of the scientific and educational network performance in the form of external audit.

Let's disclose the content of the main components of the developed external audit model.

The target component is fundamental and includes goal setting of external audit of quality assessment of the scientific and educational network performance which achievement is provided in the course of implementation of the developed and provided model. While conducting the external audit, objective and verifiable inspection and the comprehensive analysis of quality of organization activity participating in network interaction is supposed. The specific purposes of external audit are specified in the external audit program, including:

- degree determination of compliance of members' activities of the scientific and educational network with the established criteria (external and internal requirements);
- development of recommendations on corrective actions and proposals on further improvement of organization activity of the scientific and educational network;
- acceptance and implementation according to the results of external audit of management decisions in the organizations of the scientific and educational network for elimination of the revealed discrepancies, implementation of processes of continuous improvement of activities of network interaction members, education quality improvement.

It must be noted that for successful accomplishment of the purposes in the process of external audit it is necessary to collect sufficient evidences (audit evidence); based on the certificate of audit, auditors would be able to make audit opinion about a real condition (quality) of audited activities, origins of discrepancies or potential discrepancies and to determine opportunities for improvement of the educational organization performance in the conditions of network interaction.

The organizational component is systematically important in the developed model of quality assessment of the scientific and educational network operation in the form of external audit. The principles, functions, subjects, objects, carrying out scale, methods, requirements, tools and records of external audit are considered to be important elements of this component of the provided model.

The key element of an organizational component of the model appear to be the basic principles of quality assessment of the scientific and educational network operation in the form of external audit providing the model efficiency: principle of focus, principle of consistency, principle of complexity, principle of a

representativeness of auditor selection, principle of the acceptability of methodology of external audit, principle of openness and transparency of procedures of external audit, principle of a regulation of audit, principle of the paper arrangement.

We have highlighted the following main external audit functions: verificatory, informational, analytical, estimative, consultative and methodical, control and function of feedforward and feedback.

Audit is the process that involves the great number of participants. In our model as the members of external audit of quality organization performance of the scientific and educational network act the following parties: the auditors party (the chairman of auditor group, auditors, probationary employee - representatives of employers and their associations, professional communities, public organizations) and the audited, i.e. an inspectee (the leading and pedagogical staff, specialists of the inspected professional educational organization). The subject of audit is also the audit client - "the organization or the person which have ordered audit". According to the system of an independent education quality assessment created in the Russian Federation, the external audit clients can be employers, their associations, public organizations and other persons interested in audit of the inspected organization. We consider the cumulative (integrated) object of external audit as a certain type or types of activity of the organization of the scientific and educational network. The characteristics of audit objects can be the following: purposes of activities, conditions of activities implementation, processes and subprocesses, indicators and results of activities. The research of the presented above characteristics makes it possible to disclose the subject external audit better. In each specific case the choice of any objects of external audit depends on the purpose of the audit program. The scope of external audit as an element of an organizational component of the model characterizes the amount of auditor work, i.e. a set of audit procedures which are considered to be necessary for audit goal achievement under some circumstances, and goals that should be performed. Activities of the scientific and educational network in general, organization activity – participants of network interaction etc. can act as the scope of audit. The independent organization authorized to conduct external audit of activity quality, on the basis of the analysis of external and internal requirements to organization activity of the scientific and educational network, determines and develops optimum tools of external audit which are openly discussed and approved with audit clients, employers, public organizations, professional community and other parties interested in audit results. Audit records include various documentation intended for development and the analysis of the external audit program; for conduct of audit, recording of the progress and results of work on collection and the analysis of audit evidence; collection of data on the personnel involved in audit.

Such elements as regulatory support, organizational and methodical support, informational support, material and technical support, personnel and financial support act as *the resource component* providing functioning of the model of external audit. Regulatory support determines the rules of the organization and conduct of external audit regularizing an order of the relations of audit subjects. Organizational support provides availability of structure which guarantees the organization and conduct of external audit of the scientific and

educational network operation. Informational support provides audit process with the objective, reliable information necessary for the solution of audit tasks, forming of conclusions about objects of audit and preparation of audit opinions. Material and technical support includes rooms for work of auditors, office furniture, computers, printers, communication facilities, the Internet, etc. Human Resourcing Department provides the invitation of highly competent specialists, third-party organizations for the benefit of ensuring independence of auditors. Financial support is directed to a covering of expenses on the organization and conduct of external audit.

The technological component describes technological processes of external audit of activity quality of the organizations of the scientific and educational network. The process is formed by a set of the interconnected and complete works. Results of one work are the beginning of another, forming a chain. Each process consists of workflows - subprocesses and connections between them which are presented on the scheme of the model.

The productive component includes the following results of work of auditor groups. The following results of external audit are referred to expected ones:

- conclusions on external audit;
- recommendations about the adjusting and warning actions;
- suggestions for improvement and development of educational activities;
- actions in the organizations of the scientific and educational network by the results of external audit directed to correction, improvement, and development of joint activities.

The control and reflexive component is aimed at providing processes of continuous quality improvement and reliability of system of external audit involving improvement of external audit programs, increase of professional competence of auditors, timely updating and correcting of evaluative tools according to the requests and expectations of audit clients.

Implementations of the model are performed in direct interrelation of all its components (target, functional and organizational, resource, technological, productive, control and reflexive). The technology of implementation of the model of quality assessment of the scientific and educational network operation in the form of external audit is developed on the basis of the process approach. The process is formed by a set of the interconnected and complete works. The conduct of external audit of organization activity quality of the scientific and educational network includes the following phases: initiation of the quality assessment of organization activity of the network in the form of external audit, planning of procedures of external audit; organization of preparatory audit procedures; external audit of activities' quality; completion of external audit.

The main categories of discrepancies found in the process of external audit of activities have been determined in the course of the analysis:

- critical discrepancies - discrepancy wherein one or several elements of audit object either do not function or have serious (critical) deviations. A possible assessment on an audit indicator - 0; 0,3 points;
- significant discrepancies - a deviation from requirements of audit criteria. Sometimes there might be cases when the sufficient number of insignificant

discrepancies can be considered as essential discrepancy. A possible assessment on an audit indicator - 0,5 points;

– insignificant discrepancies - separate not systematic omission, a mistake, a defect in functioning of audit object, documentation maintenance which can lead to failure to comply with requirements to meet requirements or potential loss in productivity of functioning of audit object. A possible assessment on an audit indicator: 0,7 points;

– auditor's comments - methodical and/or technical shortcomings in case of requirements fulfillment of regulating documents (auditing for compliance with standards) provided for the purpose of improvement of activities and prevention of emergence of the corresponding discrepancy.

Discussions

Nowadays the following evaluation methods are applied for quality assessment of educational activities or educational operation: internal assessment, external assessment, combined assessment (with simultaneous use in evaluation procedures of results of internal and external estimates). Mainly, internal assessment includes: internal audit (self-audit) of the organization; a self-assessment (self-inspection) on various models which are conducted by the educational organizations independently. At the level of the educational organization a number of researchers present the following mechanisms of quality assessment procedures:

- certification on adequacy for the job of pedagogical and leading employees;
- intermediate and final evaluating of students;
- monitoring and diagnostics of the educational achievements of students;
- internal academic competitions, contests and other intellectual actions among students;
- social researches (polls) concerning the degree of satisfaction with quality of educational process;
- monitoring of safety of life and the health which are trained and workers during educational process;
- organization of activity self-inspection;
- visiting the theoretical and practical workshops, supervision, etc. (Horokhordin, 2006; Medvedenko & Rubtsova, 2008).

One of the effective forms of an external assessment is public evaluation which in modern pedagogical science is considered as an element of state and public management of education, the instrument of updating of management practice by educational systems. Public evaluation assumes identification and the analysis of problems of education development being a decision tool. In modern educational practice public examination is interpreted as a condition of transition to new technologies of quality assessment of education in general, and to new forms of the analysis of the achieved educational results. The result of public evaluation is not only the quantitative or qualimetric assessment, but also the qualitative (judgmental) one giving usually more complete information.

The aspiration to hide problems in this case is absent as results of evaluation do not serve as basis for adoption of executive decisions (Subetto, 2000).

In addition to the above, it is important to present some features of the external quality assessment of the educational institutions or organizations performance:

- on attraction to the quality assessment the members of various representatives: employers, professional associations and organizations, learners and their parents, citizens, public organizations and other stakeholders;
- an assessment focus on open dialogue, coordination of interests, criteria and norms of activity of all participants of assessment procedures;
- focus on carrying out open and transparent procedures of assessment; systematicity and cycling of conduct of procedures of assessment of various components of educational activity.

The analysis of the researches in the field of quality assessment of education offers the possibility to point out the main assignment of the quality assessment of organization activity of the scientific and educational network:

- implementation of diagnostics of a current status of organization activity of the network interaction;
- introduction of continuous improvement processes of activities due to identification of problem points and discrepancies in the organizations of the scientific and educational network;
- start of innovative development of the organizations at the expense of the new areas of improvement and development of activities found during evaluation procedures;
- ensuring openness of organization activity of the scientific and educational network and expansion of direct participation of professional communities, public representatives in network management;
- forming of expert community consisted of the specific organizations members interested in the development of a network; development of assessment competences among members of evaluative procedures (Davydova, 2013).

In general, quality assessment of the scientific and educational network operation in the form of external audit can be considered as a systemically important and strategic element of development network process in educational institutions promoting improvement of quality of activities of the scientific and educational network taken as a whole.

Conclusion

Thus, the model of quality assessment of the scientific and educational network operation in the form of external audit, developed on the basis of the system and process approaches, includes essential characteristics of the external audit, conditions providing its conduct, technology and expected effects as structural components. It should be noted that the accomplishment of audit procedures specialists (auditors) establish not just the elicited facts, but establish probable

causes of their origin, prepare recommendations on elimination of the revealed deviations and discrepancies, make proposals on the scientific and educational network operation improvement in general. High-quality changes in the work of the scientific and educational network are reached due to the fact that appropriate correctional activities and monitoring implementation are held in accordance with audit findings and results. Our research found that carrying out quality assessment of the scientific and educational network performance in the form of external audit also allows to reveal deviations and discrepancies of the scientific and educational network itself.

Acknowledgments

The author expresses sincere gratitude to all educational organizations of the scientific and educational network for active participation in the project development.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Oksana N. Tkacheva is PhD of Education, Associate Professor, Russian State Vocational Pedagogical University, Ekaterinburg, Russia.

Marina V. Simonova is Professor of Samara State University of Economics, Samara, Russia.

Yuriy V. Matveev is Professor of Samara State University of Economics, Samara, Russia.

References

- Bolotov, V. A. & Efremova N. F. (2007) Systems of education quality assessment. Moscow: Logos. 192p.
- Davydova, N. N. (2013) Implementing the Systematic Synergetic Approach in Management Practices Related to the Research and Education Network Development. *The Education and Science journal*, 7, 67-85.
- Dmitrieva, E. A. (2015) Concerning the Networking Interaction Experience of Teachers and Students of Pedagogical University. *The Education and Science journal*, 6, 77 - 88.
- Dorozhkin, E. M., Davydova, N. N. (2013) The Development of Educational Institutions in the Course of Networking. *Higher Education in Russia*, 11, 11-17.
- Fedorov, V. A. & Davydova, N. N. (2014) Control of the Research and Education Network Development in Modern Socio Pedagogical Conditions. *Scientific Bulletin of National Mining University*, 2, 126-133.
- Horokhordin, N. N. (2006) Methodology of Internal Audit in the Organization. *Audit Journal*, 6, 15-21.
- Kaplan, R. & Norton, D. (2008) Balanced scorecard. From strategy to action. Moscow: Olympus-Business. 214p.
- Korotkov, E. M. (2007) Education quality management. Moscow: Academic Project. 320p.
- Medvedenko, N. V. & Rubtsov, S. Yu. (2008) Assessment and its Interrelation with Control, Measurement and Diagnostics in Education Quality Management. *Standards and Monitoring in Education*, 2, 19 – 22.
- Potashnik, M. M. (2002) Quality of education: Problems and technologies of management in questions and answers. Moscow: Pedagogical Society of Russia. 224p.



- Silkina, N. V. & Vaganova, N. J. (2015) Special Features of the Educational Environment through the Net Interaction of Education and Production. *The Education and Science journal*, 6, 63-76.
- Subetto, A. I. (2000) Quality of Education: Problems of Assessment and Monitoring. *Education*, 2, 62-66.
- Zagvyazinsky, V. I., Zakirova, A. F. & Strokova, T. A. (2008) Pedagogical dictionary. Moscow: Academy. 352p.