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Efficiency Management of Educational Systems Development: Approaches and Criteria

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ABSTRACT

The relevance of the study is reasoned by the need to assess the ongoing educational reforms' implementation, to identify effective strategies, models, mechanisms and technologies. The aim of the paper is to determine the expected criteria and obtained results' efficiency of the systems' operation in conditions of high variability of external and internal environment. The paper describes the variety of cycles of the educational system on the example of university training that involves the principle of iteration using in educational development's management. The authors present certain criteria for management of educational development from the standpoint of functional efficiency of the system defining the management contour of development's efficiency. This paper is intended for researchers and specialists in the field of educational management at all levels.

Keywords: Education, Efficiency Management, Management Criteria, Life Cycles
JEL Classifications: I21, I25, I28

1. INTRODUCTION

1.1. Background

The problem of efficiency is one of the most relevant when building the systems of development's management in any purposeful activity. The educational system, as large-scale dynamic system, with high personal, economic, social effect, including deferred one, causes the necessity of innovative approaches to the evaluation problem of the ongoing reforms,' implemented programs and projects' effectiveness (Muhametzyanova, 2005; Bermus, 2002; Selezneva, 2002; Potashnik, 2002; Levina et al., 2015; Minimansurovich, 2014; Kalimullin, 2015; Vlasova et al., 2015). The strategies' development of the educational systems' and educational institutions' development in each separate region requires complex coordination often of contradicting interests of multiple participants, customers and consumers of future results.

However, during the long implementation processes of strategic decisions, there are various deviations from the planned levels of costs of all kinds and expected results due to changes in the external and internal environment of development of the educational system, for example, formation of an information society, change of ideological or educational paradigm, technical and technological achievements, etc. This makes regularly in the course of identifying of deviations, to address the analysis and adjustments of different parameters of strategic projects, including a reassessment of the indicators of their effectiveness to find ways to ensure it at the required level.

1.2. Status of a Problem

The management issues of development of educational systems, organizations and structures are being intensively discussed in scientific studies (Novikov, 2001; Novikov, 2009; Shamova, 2005).

As a rule, these discussions are of a differential nature, affecting individual moments of development's management (management, of personal development, management of teachers' development, management of an educational institution form one or another side,

management of municipal or regional development of educational levels). The lack of uniform criteria to assess the effectiveness is explained by the variability and freedom of activities of educational organizations in implementing of educational curricula, educational standards, professional standards of teachers engaged in the educational process, where the achieving ways of educational goals, methodological and methodical approaches are not regulated and many of the issues and problems of management of educational systems' and organizations' development remain open.

It is obviously that the importance of the educational system, its role in personality, social and economic systems' development determines the necessity of methods' and mechanisms' forming of development's management in modern conditions, including the search of efficiency criteria of development strategies.

1.3. The Research Hypothesis

The multiplicity of external and internal conditions of educational system's functioning determines high variability and low stability of the educational process, the complexity of formalization and prediction of the system's behavior. This forces regularly in the course of deviations' identifying, to address the analysis and adjustments of different parameters of the development's implemented strategies at all levels of system's functioning, including the re-evaluation of indicators of their effectiveness to find ways to ensure it is at the required level (Mukhametzyanova and Levina, 2015).

All the above mentioned allows to interpret the long process of educational system's development as aimed not only at achieving of goals, but also directed on a certain management of the development's effectiveness.

2. METHODOLOGICAL FRAMEWORK

2.1. Features of Educational Services' Implementation

Educational service as a public good is characterized by joint consumption character, non-excludability, indivisibleness, generation of significant external positive effect, which is reflected in the high rates of productivity and economic growth, enhancing of social stability and strengthening of the competitiveness of the national economy (Valiev and Suhachev, 2008).

The peculiarity of educational services is in its targeting, high personal, social and economic importance, both in perspective and in the current moment. Besides, the connection of stakeholders of education is fairly complicated and even contradictory (Levina, 2015).

Thus, the state as an educational agent serves as the services' customer, determining the demand for the professions, as services' producer (most educational institutions at all levels - The state ones), providing normative-legal regulation and control, as services' consumer in economic terms (gross product) and in social aspects (cultural, scientific, technological aspect).

The person (learner) as an educational agent is a consumer of educational services, providing the ideal professional and personal development, the development of essential professional and cultural competences. Besides, the learners in a sense are the producers of educational services by participating in learning processes and taking responsibility for their own learning.

Representatives of business (employers) are simultaneously the customers (identifying the needs of the economy, the demand for the profession), the consumers (providing jobs), and producers of educational services (participating in the educational process, providing practice-oriented courses, training practice).

Society (students' parents) is the customer and the consumer of educational services, ensuring the students' passing of educational levels, actively participating in the choice of profession, providing its support throughout the training and consuming in a personal and social aspect the educational results.

Employees of the education system provide the production of educational services, being at the same time their consumers participating in educational processes and implementing their own retraining.

This complex network of interactions determines the relevance of the topic on social responsibility of the entire education system and of each its entity. The position of educational systems and organizations in socio-economic environment causes the search of mechanisms and methods for its development's assessing at all levels and stages.

2.2. Criteria Analysis of Efficiency Estimation of the Educational System's Development

The diversity of points of view on the development's effectiveness of education systems is conditioned by the integrative nature of the system, the totality of social, cultural, scientific, technological, student-oriented points of view on educational processes.

Thus, it is proposed to evaluate the effectiveness of education systems' development at all levels through:

- The interrelation of indicators of education system's efficiency and economic indicators of regional development
- The impact of education on employment and on the labor market
- The proportion of employed graduates
- Measuring of the effectiveness of training curricula based on the cost of education per student.

Besides, all researchers note that the effectiveness of education systems' development is difficult to be formalized by a single criterion.

It should be noted that the educational system is considered as an aggregate of educational organizations of the same level (primary, secondary, vocational, higher). Taking into account it, the development of the educational system can be considered through the prism of quality indicators' criteria of educational processes implemented in educational organizations. This allows meaningful assessment of efficiency indicators of educational systems' development from the standpoint of educational services'

quality. The list of these indicators is open for any additions depending on external and internal conditions.

2.3. The Efficiency Determination of Education System' Development through the Methodology of Total Quality

The authors stand for the view that the basis for integrating of all educational agents' interests may be the quality of education as the effectiveness of the system's activities in its continuous development. The basis for this vision is the approach proposed by Juran, which consists in the idea that quality is to be presented at the same time as planned result and as strategic resource, which is implemented through the tasks of quality planning, quality management and continuous improvement of quality (Ishikawa, 1988; Juran, 1992; Crosby, 2004; Deming, 2011).

The existing standards of educational quality are based on ISO and TQM standards, ENQA directives, providing basic guarantees-satisfaction of the consumer and society, that is, the quality of education can be a criterion for balancing of all educational agents' interests. Criteria of educational processes' quality (satisfaction of stakeholders) and their monitoring conducted within the framework of implementation of the quality management system, in our view, more fully define the management efficiency criteria of educational processes' and educational systems' development (Levina and Gumerov, 2015).

The peculiarity of this approach is determined by the following tasks' solving: (1) Evaluation of the effectiveness of management of educational system's development is carried out through monitoring of interacting processes, which significantly simplifies the mechanism of diagnosis; (2) evaluation of the effectiveness of management of the educational system's development is carried out "here and now," there is no delayed effect of estimation, which allows to realize the principle of iteration, which consists in the possibility of step-by-step approach to the planned result and, if necessary, to adjust management actions. This position is a priority for the educational system, the functioning of which is influenced by high variability of the external and internal environment; (3) the effectiveness criteria search of development's management is significantly simplified - they are the indicators of the quality of each process, due to the implementation of the quality management system in educational organizations.

3. RESULTS

3.1. The Principle of Iteration in Management of Educational System' Developments

Iteration in our understanding serves as an approximation to the goal under existing conditions. It should be noted that, while checking the accuracy of this approximation, at every new iteration the previous accumulated result of the same operation or action is used. With each iterative cycle there is a movement to achieve the target results, which allows for the projection of the established mission of the educational system at all its levels, processes and actors. The determination of the reasons, properties and regularities of the processes of professional education's development in one iterative cycle gives an understanding of the nature of the deviation, possible risks (loss of processes and their results) and knowledge about the way of development and determine possible direction of improvement, that is, a continuous monitoring of the results within one iteration cycle. Indicators of the educational processes' development after a few cycles of iterative improvements become the "standard."

Thus, the implementation of the principle of iteration can be considered as a promising managerial mechanism, which is to the maximum extent is oriented on the problems' solving of management of educational systems' development and improvement.

The main aspects of management of the educational system's development from the standpoint of the iteration principle's implementation:

- This is a cyclic process consisting of a sequence of actions in condition of their analysis, correction and improvement.
- It connects all the actors of development on the basis of functioning with maximum efficiency.
- It is focused on the mission's, goals' and patterns' defining of educational system's development taking into account the dynamic characteristics of the external and internal environment.
- Has the capability of forecasting and reaction to change.
- Has tools for determining of the effectiveness of development strategies.
- Has a clear system for evaluating of strategic objectives' achievement (indicators of the effectiveness of the strategy).

3.2. The Iterative Cycles in the Educational Systems

Planned target indicators of the implemented innovation processes in the educational system are undergoing by continuous control to prevent gaps between strategic direction and operational actions, every change is subjected to serious evaluation by its degree of influence on the strategic vision of the system. Analysis of negative factors is a way to improve processes at the next iteration of the cycle. It is obvious that the planned values of educational processes' indicators should have established boundaries and high sensitivity. It is necessary to control the variability of values and maximum possible value of changes that is determined by the controllability of the processes. This iterative procedure allows to substantiate decisions and to carry out updating of operational activities in the educational system.

The iterative cycles in the educational systems are justified and the mechanism of their initiation, causing the development of educational systems and processes is defined at levels of: Generalization; stratagem; organization of the educational process; implementation; assimilation (updating). Data are presented in Table 1.

The criteria for the initiation of the iteration are identified, which are determined by the state for management of pedagogical processes and the degree of their variability. This iterative procedure allows to substantiate decisions and to adjust management activities designed to improve the education systems' and processes' state.

Table 1: A set of iterative cycles of the educational system

The level of generalization	Initiation of the iteration	Increment of iteration
The level of generalization		
Regulatory level	Educational paradigm (socio-economic, political conditions)	Time, external and internal distortion
Continuous education system	Levels of education (preschool, General secondary, vocational, higher)	Time, knowledge (level)
Research and industrial cluster	The change in technology	Time and levels
The system of education	The level of socialization	Time, cultural values
The level of strategema	Initiation of the iteration	Increment of iteration
Strategic vision	Regulations, social requirements	Time, echogenic and endogenous factors
The mission	Echogenic and endogenous factors determining development's opportunities	The time, status indicators
Strategic plan	The needs and conditions of educational systems' development	Time, system status indicators
Operational plan	Management decisions	Time, system status indicators
The quality management system	The requirements of standards, management decisions	The time, indicators of the status of processes
The level of organization of the educational process	Initiation of the iteration	Increment of iteration
Educational plan Curriculum Training (vocational) module Academic discipline Training session	Standards, organizational and pedagogical conditions, management decisions	Regulations, standards, time, indicators of the status of processes
The level of implementation	Initiation of the iteration	Increment of iteration
Curriculum Vocational module Educational-methodical complex Theme Lesson	Standards, organizational and pedagogical conditions, management decisions on the organization of the educational process	Regulations, standards, time, indicators of the status of processes
The level of assimilation (updating)	Initiation of the iteration	Increment of iteration
Graduation thesis work Final test of knowledge Test work Lesson Updating New material Exercises Repetition Preparation (h\t) A task	Standards, organizational and pedagogical conditions, management decisions for control of the course of educational process	Requirements to level of knowledge, time

It is obvious that the development's efficiency management at every level must be ensured by monitoring of the indicators, taking place in certain time intervals, not longer than the actual iterative cycle.

3.3. The Criteria Definition for Management of Educational Systems' Development

Management of educational systems' development is aimed at positive change in its current state, modeling, implementation and monitoring of development path for achieving those goals. Goal setting is the start point and involves the parameters', conditions' and mechanisms' setting of management at each level of the iterative cycle, providing control effects within the positive impact of the goal's achieving. The issue of efficiency of the educational system's units is to increase the level of management, modernization of management's educational models and the introduction of innovative educational practices.

According to the theory of management from the stand point of feedback there are three main types of management: In closed loop, in open loop and isolated management.

In closed-loop output parameters of the system are analyzed at the inlet, the management is performed cyclically at the expense of internal resources (self-governance), therefore the terms of the management is the presence of information security (the organization of information flows and communication channels of the system), methods of information processing, as regulatory corridors of values, mechanisms of managerial impacts.

Open loop of management with no feedback from input to output, assumes the implementation of managerial impacts from the external environment (legislative management of results and processes). Then the realization conditions of this type of management will be the availability of information for the managing entity, adequately describing the current situation within the established parameters and method of distribution of the received management information. Isolated management implies the absence of unwanted information inputs and outputs of the controlled system, providing a high level of security. The main condition of this management is the technology of processing and protection of information.

In real education systems there are two types of management, the shares of which vary (closed and open) depending on the type of educational units' independence, the autonomy of educational institutions, etc. Isolated type of management in educational systems arises when considering it as an element of market relations in the implementation of educational services, determining of competitive advantages in the form of pedagogical and scientific technologies.

Complementing the classification system of educational systems' managerial methods (composition, structure and function of the system) proposed by Novikov (2009), the following methods of educational systems' development (structural units) can be distinguished:

1. Institutional management is available on all hierarchical orders, orders of higher authorities and reports on their implementation.
2. The structure's management determines the hierarchy of subordination on the type of organizational structure and technology of management decisions' transfer.
3. The composition's management is a management organization of educational institution's personnel training and retraining.
4. Motivational management means favorable changing of subordinates' preferences for management, contributing to the solution of management tasks.
5. Information management - A continuous, dynamic and changing part of the management for granting of an optimally grouped data for management decisions' making to achieve these goals with existing resources.
6. Process management - Review of structural units of the educational system in the form of network of interrelated processes (sequences of regulated operations), collectively and individually focused on the end result.
7. Pedagogical management - Management of interaction between the teacher and the learner with regard to the content of education and training using various teaching resources aimed at the implementation of pedagogical tasks, ensuring the satisfaction of needs of society and the personality in its development and self-development.
8. Self-government (students) - Management of students' processes of self-development and self-education, namely motivation for learning, initiative, planning and organizing their own educational activities, self-reflection.

In Table 2, depending on the levels of iterative cycles of the educational system the methods and criteria for development's management are presented.

Thus, the conditions for development of educational systems based on the principle of iteration are:

- Finding of the interests' coordination field of all educational agents in relation to goals and objectives based on a framework model of actions of participants of a system that allows in a certain way to consider the system from different points of view depending on the interests and expectations of its participants.
- Avoiding the use of totalitarian or authoritarian models of governance.
- Management of educational systems and structures based on dynamic and scenario modeling, forecasting, the use of foresight technology, benchmarking, taking into account the high inertia of education.
- Progressive realization of state and public management.
- Scientific substantiation and development of scientific and pedagogical support for the modern theory of management of professional education.
- Adaptation (benchmarking) of advanced foreign and domestic management experience in the field of vocational education taking into account the national traditions.
- Informational transparency of vocational education.

That is, the iterative approach is regulated and standardized approach to strategic objectives, justified at the stage of strategic analysis. The functionality of the strategy is enhanced by clarifying of operational goals and actions' adjustment of the implemented processes. At the starting point of each iteration the availability of resources and the environmental status is fixed. The initial information for subsequent iterations is extracted

Table 2: The efficiency criteria of management of educational systems' development

The iteration-level	Management method	The type of reporting of the educational system	The efficiency criteria of development's management
The level of generalization	Institutional management The management of structure Information management	Reporting on the implementation of strategic programs	Dynamics of statistical indicators of socio-economic development of society
The level of strategema	The management of structure Motivational management Information management	Reporting of structural units of the educational system	Indicators of the quality management system of the structural units of the educational system
The level of organization of the educational process	Process management Motivational management Information management	Reporting of the entities who are responsible for the process	The effectiveness of the processes of structural units of the educational system
The level of implementation	Motivational management Pedagogical management Information management	Normative reporting of the teacher (plans, work curricula, lesson plans, etc.)	Standard indicators of educational-methodical maintenance of educational process
The level of assimilation	Pedagogical management Self-management of the learner Information management	Reporting on the results	Learning outcomes (indicators of control points)

from the project's implementation during the monitoring phase of the previous iteration. These criteria are: Stakeholders' interests (with regard to the necessary balance of interests); the strategic importance for solving of the tasks; resource provision; estimated time of achievement; prospects of problems to be solved in this iteration.

4. DISCUSSION

The development of vocational education is a consequence of the current political, economic, social transformations and characterized by managed changes within the existing structure. Accommodation of necessary changes requires for modification or transformation of the education system's state (structure) - A new iteration cycle begins occurring under new managing impact and changed functioning of their criteria parameters. The starting point of the iterative cycle is determined by the instability condition, unacceptable deviations from the target values, temporal characteristics, low adaptability of a system or structure (crisis) to external or internal conditions, lack of opportunities for initiation of innovations. For each starting point of the iteration the overall strategy, the task of the current iteration to be solved through the implementation of the project, general requirements for the values of benchmarks and selection criteria of strategic alternatives arising when there is a change of the external environment, which are formed on the basis of the scenario of the system's development must be defined.

5. CONCLUSION

The proposed iterative principle in the framework of management of educational systems' development can be used as a methodological basis for the development of educational systems and structures, providing: Possibility of its application in conditions of time constraints; selection of adequate range of alternatives on the basis of interests' balance of the educational agents; a significant reduction in the risk of deviation from the goals in connection with step-by-step implementation; enhancing of the formalization and the computerization of management.

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