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MANAGEMENT OF THE EDUCATIONAL PROCESS

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Annotation

The methodology of building an information model for managing the educational process at school is considered. The educational process and the basic principles of managing such a process have been systematically analyzed (including the decomposition of goals by hierarchy levels and their operational monitoring for further objective management decisions, the role and methods of motivating participants). On the basis of the considered principles, an information model for managing the educational process is proposed, the key element of which is a system of operational testing of students' current knowledge and skills. Based on the test results, ratings are formed, which allow you to determine the degree of achievement of the set goals and to make objective management decisions in a timely manner. In addition, the results of the ratings are the basis for a motivation system for all participants in the process, aimed at stimulating their interests.

Keywords: distance education, education, management in education, target functions, monitoring in education, motivation in education, testing of knowledge and skills.

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Introduction

The modern education system is subject to constant changes from external governing bodies. As a rule, the main goal of the changes is to increase the general level of education and its objective assessment.

The formation of a system for assessing the quality of education is one of the key priorities in the development of education in many countries of the world. The system for assessing the quality of education is designed to provide students and their parents, teaching staff of schools and teachers of vocational education institutions, educational authorities at all levels, civil society institutions, employers with reliable information about the state and development of the education system at different levels [2]. The task of assessing the quality of training is very important for making managerial decisions at all levels of management. To successfully solve this problem, it is promising to use the information-theoretical approach, which provides for the creation of an information model of the corresponding educational structure, regular monitoring of the integral quantitative parameters of the model, and making management decisions based on the monitoring results.

For the quantitative assessment of skills and abilities, special tests are used or exams are conducted with the participation of an expert examiner, which end with the assignment of quantitative marks to the examinee. Regular testing based on special tests (such as the Unified State Exam) is used more and more often, but it is accompanied by such problems as changing the priorities of students from acquiring knowledge exclusively to preparing for the exam, the inability to reveal the true knowledge of students, as well as a high degree of psychological stress on the examinees due to their unpreparedness to this type of exam [1]. Therefore, the test application methodology needs significant modifications in order to make the testing process itself a natural part of learning and not cause rejection of students. Rather, on the contrary, this process should be given a fascinating form with elements of competition.

The purpose of this work was to develop an information model for managing the educational process, which involves solving such problems as:

- providing a tool for objective assessment of students' knowledge and skills;
- provision of a decision support tool at all levels of management in different time horizons - strategic, tactical and operational;
- development of a motivation system for key stakeholders.

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Design principles and methods

In modern practice of managing social objects and processes (including educational ones), more and more priority is given to classical systemic principles, when a control object is considered as a system, i.e. possesses such characteristics as: purpose, integrity, hierarchical structure, complexity, multiplicity [4], feedback. In addition, any object with this approach has an input and output (result) and a control mechanism, and the internal structure of an object is a set of interrelated elements.

Thus, considering the educational process as an object of management from the point of view of a systematic approach, the following conclusions can be obtained: the educational process is the process of transforming the knowledge and skills of students before learning (input of the system) into the knowledge and skills necessary and satisfying the requirements of the students themselves, their parents, educational institution and other interested parties (output of the system and its purpose). The educational process consists of a number of interacting components such as teaching staff, classes, individual students and their parents. Management is implemented through management decisions at all levels of the hierarchy of the organizational structure of an educational institution (management mechanism) based on the results of monitoring (feedback) of process parameters (Fig. 1). Through the communication channels, information is exchanged between the listed participants in the process (the relationship between the elements of the system).

The educational process is multi-parameter, and the parameters are often correlated, and therefore the control process is not factorized, which does not allow to reduce it to a sequence of one-parameter control problems [3]. The task cannot be formalized by obvious methods (that is, the parameters and criteria that determine the goals of the process cannot be represented in mathematical form). To create a quantitative description, poorly formalized procedures such as obtaining subjective-statistical expert assessments are used. Several large interacting modules can be distinguished in the model, each of which consists of information-related objects. The technology and physical implementation of a Office solutions re of many varieties and in each specific case can be very different from each other. The reliability of the results of processing, estimation of parameters, decision-making, which are probabilistic in nature and are always inaccurate, may depend on this.

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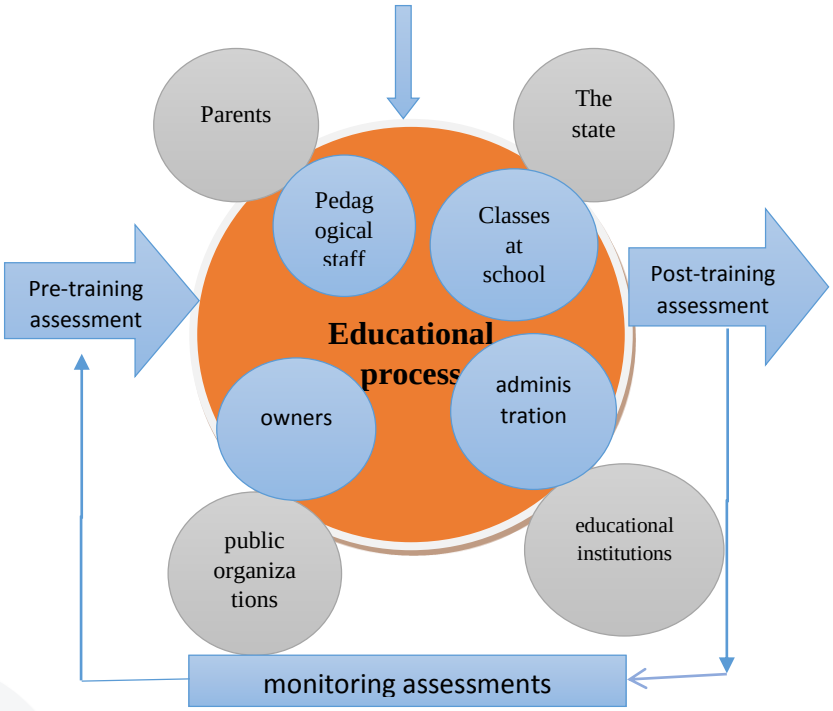

Fig. 1. The educational process as an object of management from the point of view of a systems approach

Considering the educational process as a system consisting of interconnected elements, we find that each element of the system has its own purpose (it follows from the property of the integrity of the system), i.e. the learning process is multipurpose. Therefore, the formation of target functions of the educational process and its components is a necessary condition, without which it is practically impossible to implement a modern management system.

Thus, each participant in the educational process has its own goals (or target functions), which, as a rule, differ from the goals of other participants. If the goals of the participants have a strong divergence or deviation from the optimal values, then the system leaves the state of stability.

The task of ensuring the stability of the system is solved by deploying target functions along the levels of the hierarchy of the system (organizational structure in an educational institution), taking into account the time horizon (strategic (long-term), tactical (medium-term) and operational (current)). In management practice, an example of solving this problem is the Balanced Scorecard, developed by Robert Norton and David Kaplan in 1990. The Balanced Scorecard is the concept of

transferring and decomposing strategic goals for planning operational activities and monitoring their achievement [5].

The degree of achievement of the specified values of the target functions is the basic information for making objective management decisions that correct the educational process to achieve the set goals (implementation of feedback and the control mechanism). It should be borne in mind that management decisions in the event of deviations from the normatively specified values will be effective only if they are taken at an early stage of identification, when the system is in a state of stability (in this case, linear management methods are used that do not require additional resources). That is, the frequency of assessment should correspond to the dynamics of the learning process - monitoring of the knowledge and skills acquired in the learning process should be carried out with a frequency that allows you to introduce the necessary adjustments directly into the educational process.

However, as mentioned above, the educational process is multi-parameter, which leads to the emergence of a huge number of target functions, which makes it difficult to monitor them and make management decisions due to the redundancy of information. Thus, when developing criteria for assessing the quality of training and when assessing the parameters used in the development of management decisions, it is necessary to select such parameters that can be used for most of the target functions. Weights should be placed taking into account the importance and priority of a particular criterion. Arrangement of weight coefficients is the task of experts, as well as recommendations on the parameters chosen to describe the system and its individual components.

It is necessary to understand that in the educational process, the achievement of the established target values primarily depends on the participants in the process itself, i.e. the participants in the process must be sufficiently motivated to achieve them. An effective tool in this case is the introduction of a motivation system aimed at stimulating the interest of all participants in the educational process: students, teachers, parents, administrators, and at intensifying the interaction between them in the directions necessary to fulfill the main goals of the educational process.

Information model of educational process management

Summarizing the above principles of designing a management system for the educational process, we have developed a management model that includes objective testing, which is part of the learning process. This means that tests should be

integrated into the learning process, which traditionally consists of several components:

- Installation sessions (lessons, lectures), which provide basic information.
- Homework assignments that develop practical skills in working with sources (ability to solve problems, formulate thoughts, etc.).
- Assessments that assess current learning progress.
- Practical classes, trainings, etc., in the process of which the formation of skills and the ability to use the existing knowledge is provided.

Testing is included in the learning process at the stage of an orientation lesson (homework is formulated, which provides for the creation of tests by students on a given topic, which they must prepare using recommended and / or independently selected materials on the topic).

The created tests are used to conduct surveys in the control session along with tests selected and trained by teachers. Based on the results of the surveys, two marks are formed: according to the results of the answers to the tests and according to the results of how other students answered the tests of the assessed student (the mark for "creativity" and the mark for "analyticity").

Ratings based on the results of regular testing are formed according to a special algorithm, which also forms two ratings - for creativity (creativity) when creating tests and for analytical skills shown when solving tests compiled by others. These ratings show not only the level and quality of acquired skills and knowledge, but also the dynamics of their change over time, make it possible not only to compare different students (competitive element), but also to consider the dynamics of the learning process. The ratings are formed on the basis of the principles of robust statistics and are mathematically stable estimates of the processes under study. Progress or regression in the learning process of each student is determined based on the assessment of statistically significant increases or decreases in ratings over the monitoring period.

According to the parameters that are obtained on the basis of mathematical processing of test results for the analyzed groups, it is possible to compare teachers, different groups of students (classes and schools) and formulate control decisions to correct the process at any level (individual student, class, school, etc.) ... The frequency of the assessment and decision-making process is determined by the dynamics of the learning process (from weekly to annual with breakdowns as the curriculum is completed).

At each cycle, testing is carried out at different levels (based on the materials of the topic, subject, individual sections of the curriculum, assessing skills and abilities). Accordingly, the results are processed and decisions are made based on them. After receiving the estimated values of the general parameters based on the test scores, the decision-making system gives out recommendations for adjusting the educational and organizational processes that are implemented by the executive system (teachers, methodologists, school administrators, departments, managers, etc.).

For example, a teacher's performance can be measured by how the ratings of his class compare with those of other grades and how they change over time. The results of a school's work are determined by target functions that are formulated on the basis of the interests of its owners and / or leaders of the higher education system. It is clear that these functions do not necessarily coincide with the target functions that determine the reaction of students and parents. In particular, for the owner of a private school, economic performance can be as important as student ratings. But, of course, there is a correlation between these parameters: the higher the ratings, the higher the authority in the eyes of parents and students and public opinion, the higher the competition for admission to school and the income of the owners.

The main results of this work formed the basis for the development of the "6th point" project, which combines the principles of full-time and distance learning with the help of a system of distance consultants. For this project, in addition to the testing system, the formation of ratings and the motivation system, a procedure for remote registration of users was created for the correspondence training scheme, which implies the issuance of diplomas and certificates as a result. This task is very important to ensure the legal relevance of the learning process.

Conclusion

Thus, we have developed a methodology for organizing current testing at the operational level using a system of tests integrated into the learning process and formed by the students, teachers and methodologists themselves. Testing is carried out during control lessons, which are conducted using electronic means. The results are processed mathematically in order to calculate the current values of the objective functions for various participants in the process. Based on the calculated values of the target functions, stakeholders make decisions that are used in managing the educational process at the operational, tactical and strategic levels (while making

decisions, information obtained from other types of monitoring can also be used (for example, monitoring financial indicators, monitoring data on competition for an educational institution, staff turnover, media reactions, etc.). The task of managing an educational institution is solved on the basis of an information model of the educational process. A set of target functions is created, which are necessary for the development of management decisions at the strategic tactical and operational levels by various participants in the process.

1. Based on the objective functions, an optimal (from the point of view of correlation and completeness) system of parameters estimated in the monitoring process is created, on the basis of which, by means of mathematical processing, the values and distributions of objective functions necessary for decision-making are calculated.
2. The main link in the management system is monitoring the assessment of students' knowledge and skills, which is integrated into the educational process. In the process of creating test items, teachers (including authors of curricula), methodologists, students participate (this is the most important feature of the proposed methodology).
3. Interaction and exchange of tests between students of different levels is created. Not only the ability to solve test problems is assessed, but also to create them on the basis of curriculum materials and additionally involved (that is, the analytical and creative abilities of students).
4. Game and competitive elements are actively used, taking into account the specifics of the age psychology of students. Monitoring results are used to compile rating lists for students, teachers, classes. Based on the rating lists, a motivation system is created for each participant in the process (including, first of all, for students, parents, teachers).

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