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MODEL OF SUPPORT MANAGEMENT OF TRAINING MASTERS IN EDUCATIONAL INSTITUTIONS OF FIRE AND TECHNICAL PROFILE

Abstract: *there is a typical delusion that maintenance of educational activity in magistracy is simpler, than at the previous stages because number of trainees are significantly less. Practice has shown that this argument has no reasons; individualization of trajectory obliges to form documents not for profile group that is feature of process training. Process becomes complicated in departmental educational institutions in connection with target influence of profile Ministry. Therefore, modeling of information and analytical system of support management of magistracy is important and relevant.*

Key research problem is development of model and algorithms of formation information system of support management of profile magistracy allowing analyzing current state taking into account specifics and specialization of preparation, to form individual trajectories of trainees according to criterion functions and possible indignations in course of training.

Key words: *model, system of support of management, profile magistracy, model of competences, individual trajectories.*

Language: *English*

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Introduction

Continuous changes within the last decade in system of higher education have led to almost incurable consequences, both for labor market, and for general education level in country. This problem area is relevant both for Russia, and for the Republic of Kazakhstan. The education level of younger generation steadily falls in classical representation of stage-by-stage delivery of knowledge for different age categories. The general qualification of again trained staff also according to statistics and sociological polls quite low. As the reason serves the dynamic system of continuous changes in educational process, ordered by public authorities. At the same time, the applied settled classical principles transfer of knowledge system of professional education are forced to change, be modified, improve, to be reduced and be modernized according to requirements of labor market. The artificial system of hierarchy requirements to educational programs have led to fact that trainee of first step higher education doesn't conform to requirements of the Labor code for acceptance to a position anymore and it is forced to look for (independently) additional opportunities of finishing learning, receiving specialization. In other words, the new system of bachelor degree has led to fact that system of labor relations was not ready to accept a stream of new young shots.

Discussed problems

In these conditions, for higher education institutions of country formation on basis of educational platforms of profile magistracies allowing the trainees who have finished a bachelor degree to continue process and to receive specialty became rather new trend. From the point of view state regulation by educational environment, this stage has to be form on basis of programs of higher education institutions that should not cause additional problems when opening new directions of magistracy. Nevertheless, practice has shown

boomerang effect. The first attempts of fast formation have caused a number of misunderstandings when forming necessary documentation.

One of key problems of such situation is that modern profile higher educational institutions are in great need in development of new specialized methods and methodologies allowing to plan educational process taking into account the modern requirements imposed to undergraduates to keep account of dynamically changing loading quickly to provide summary information on trainees, to analyze data of individual schedules of schedules and loading of classroom fund, etc. The described tasks extend to all stages of process training, beginning from a stage of entrant. In process of "growth" of trainees, these processes become complicated, sated with contours of individual training. There is a typical delusion that maintenance of educational activity in a magistracy is simpler, than at the previous stages because the number of trainees are significantly less. Practice has shown that this argument has no reasons; individualization of a trajectory obliges to form documents not only for profile group that is feature of process training. Process becomes complicated in departmental educational institutions in connection with target influence in a control system of profile Ministry. Therefore, modeling and algorithm taking into account the described criteria of information and analytical systems of support management of a magistracy is relevant.

As decision the model of system support of management capable "to prompt" versions of decisions at different stages of life cycle magistracy on chosen profile (Fig. 1) [1] is create.

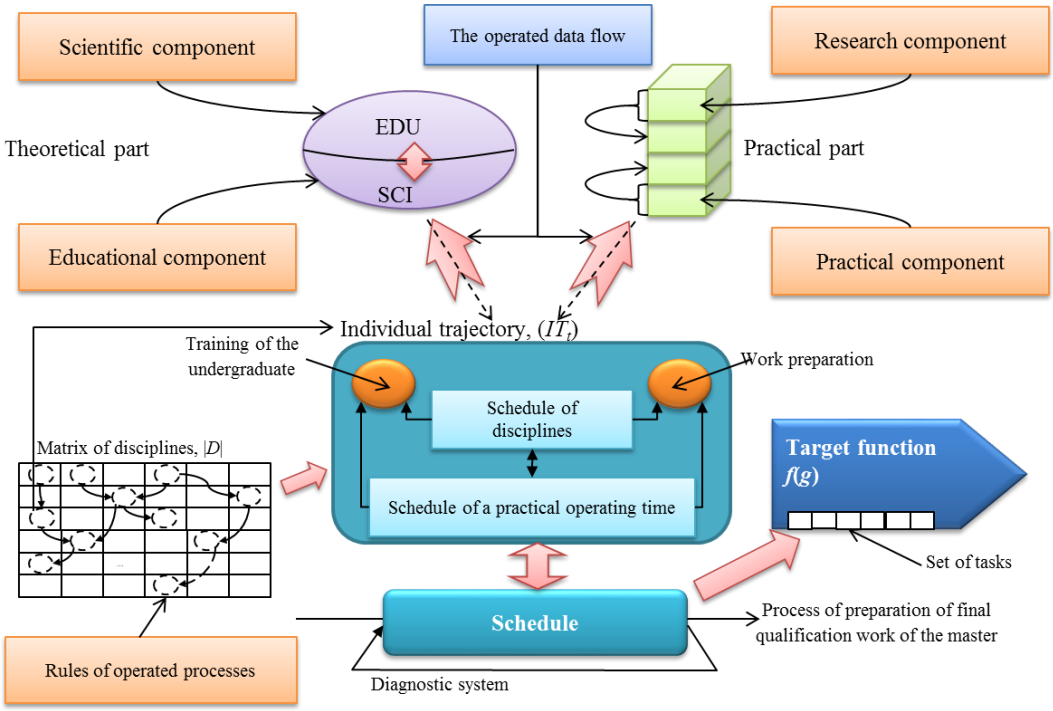

Figure 1 – Concept of system support management

The next highlights of realization of presented model are assume:

i) introduction in main process of formation profile magistracy of criterion function of $f(g)$ constructed on an individual trajectory of trained (IT_t) that will allow to avoid errors of replication of complex knowledge without preliminary systematization of requirements of final work [2];

ii) development of an individual matrix of disciplines of $|D|$ with use method of through project that will allow to establish control points of all magistracy objects, obligatory for training, within solvable total tasks [3];

iii) embedding of strictly hierarchical system of a consecutive tasks in total function of trajectory training (H_t^p, where p – hierarchy level) that will allow trainees to obtain at each stage full reliable information on current state [5].

In work, it is offer to introduce in process of formation magistracy the target model constructed on way an individual trajectory of trainees that will allow avoiding an error of delivery of complex knowledge without systematization of results of final qualification work. Use method of projects at heart of matrix disciplines will allow carrying out control points of all objects magistracy within solvable total tasks. The built-in system of consecutive tasks in

criterion function will allow trainees to obtain at each stage full reliable information on the current state. Use of algebraic rules at the heart of hierarchy of design activity will allow eliminating effect of redundancy that, in turn, will allow increasing coefficient of timeliness of obtained information. In total, the applied methods allow to simplify significantly process of adoption administrative decisions by preparation magistracy for new directions and maintenance of current.

The presented features allow putting new requirements to formation of complex model developed system of support management capable to build schedules of individual trajectories taking into account constantly changing criteria and problems of criterion functions.

1. Modeling system of support management when forming individual trajectories of trainees special profile

As the main model of formalization of schedules of individual trajectories (P) the adapted branching mechanism in the form of two two-submultiple schedules where second trajectory is inverse criterion function with control nodal points (Q) is used. Levels of hierarchy are respectively designate by coefficients of α and β (Fig. 2) [6].

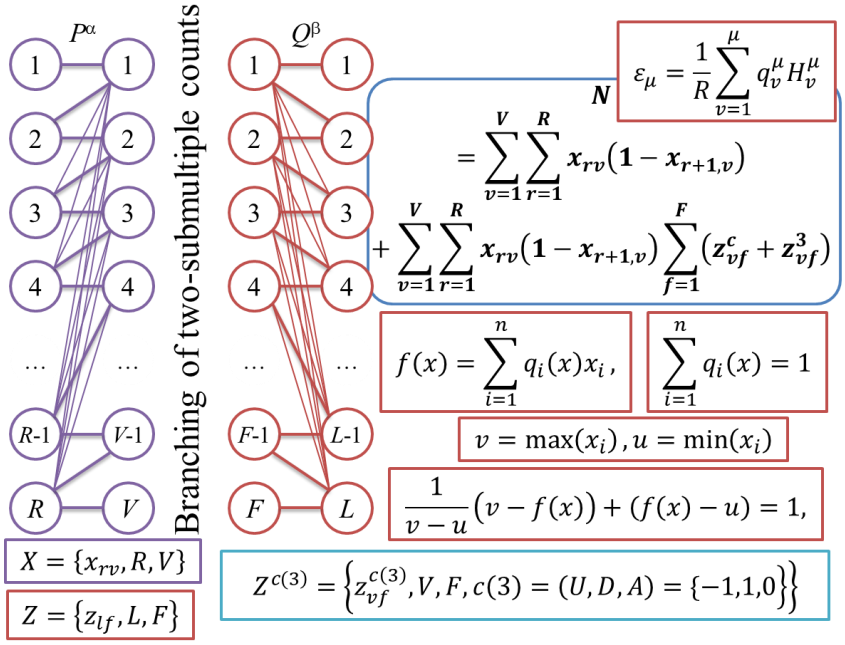

Figure 2 – Synthesis individual trajectory and hierarchy of target task

The sets of basic data in columns are designated by X and Z where values of elements are defined by formation of processes for creation of next communication the column $R \rightarrow V$ and $L \rightarrow F$ respectively where $= \{x_{rv}, R, V\}$ and $Z = \{z_{lf}, L, F\}$.

Then the set of decisions on key nodal points of counts (by comparison of graph points) can be define how [7]:

$$Z^{c(3)} = \{z_{vf}^{c(3)}, V, F, c(3) = (U, D, A) = \{-1,1,0\}\}, \quad (1)$$

where $c(3)$ defines a concrete way of description of set of decisions. Consists of three parameters: U – a set of processes, D – a set of elements and A – the contiguity matrix consisting of the entering/leaving or intermediate variables of a task. At the same time it is necessary to consider that for each parameter, only three states are admissible: "+1" – proceeding, "-1" – the result and "0" – is not use that conforms to requirements of correcting mechanism coefficient of "branching and borders". Taking into account terminology, criterion function can be present in the form:

$$N = \sum_{v=1}^{V}\sum_{r=1}^{R} |x_{rv}|(1 - |x_{r+1,v}|) + \sum_{v=1}^{V}\sum_{r=1}^{R} |x_{rv}|(1 - |x_{r+1,v}|) \sum_{f=1}^{F}(kz_{vf}^{c} + lz_{vf}^{3}), \quad (2)$$

where z_{vf}^{c} defines communication with elements, and z_{vf}^{3} – communication with data arrays, k and l – necessary coefficients upon transition from an element form to processing to facet (coefficients set a binding to a concrete hierarchical tree of decisions.

Achievement of total purpose is possible only in that case when at each stage assessment solution of tasks for parallel branching is carry out:

$$\varepsilon_{\mu} = \frac{1}{R}\sum_{v=1}^{\mu} K[q_v^{\mu} H_v^{\mu}], \tag{3}$$

where R – restriction for quantity of versions decisions, q_v^{μ} – a tree element Q distributions on massifs of versions of decisions, H_v^{μ} – hierarchy level, μ – the level of hierarchy, K – a set of necessary coefficients of a matrix form of processing decisions.

Essential distinction of model is use instead of standard mechanism of coordination decisions on knots, modification of model mechanisms of coordination in case of two alternatives where the main condition of priority decisions is defined as:

$$\begin{cases} \dfrac{1}{v-u}\big(v - f(x)\big) + \big(f(x) - u\big) = 1; \\ v = \max(x_i)\,, u = \min(x_i)\,; \\ f(x) = \sum\limits_{i=1}^{n} q_i(x) x_i\,, \sum\limits_{i=1}^{n} q_i(x) = 1, \end{cases} \tag{4}$$

where u and v – set limits of decisions, $f(x)$ – defines a complex of decisions for achievement of total purpose, x_i – set initial priorities.

Based on received description of criterion function with the correcting coefficients the criterion function of strictly hierarchical system of a consecutive tasks present in the form of model of comparison of individual trajectories to criterion function is create. Feature of received function is that the criterion of assimilation of disciplines is use as initial function, but is change as features of process of training in a profile magistracy are considered:

$$P_{\text{осв}} = \frac{N(t - t_0)}{t\sum r}\left(1 + \sum_i f_i\right)(1 + [0{,}6U]), \tag{5}$$

where $P_{\text{осв}}$ – the main criterion of assimilation target program on basis of analysis condition of key parameters. Not predetermined function r (quantity of subjects for studying) is replaced with the sum of a number of consistently studied disciplines of $t\sum r$, τ (possible period of training) is replaced with in advance preopredelenny interval period $(t - t_0)$, ν (frequency of visit of occupations) in the form of probabilistic assessment is replaced with the periodic, estimated according to statistical data N, f (financial security) in the form of a summary indicator is replaced with the sum of a number of financial sources $\sum_i f_i$, U coefficient (a possibility of remote access to resources of educational process), is replaced in connection with accounting of features of possible distance learning during the different periods of time with involvement of external teachers [8].

As a result, the accounting of a basic trajectory considering process of training of group in general is unimportant at an initial stage; therefore, function of trajectory can be present in the form:

$$Q = \sum_{i=1}^{N}\left(Q_i^{\text{баз}} - \sum_{j=1}^{r} c_j f_{ij}\right)^2, \tag{6}$$

At set restriction:

$$Q = \sum_{i=1}^{k}\left(Q_i^{\text{инд}}\right)^2 \to \min \tag{7}$$

The main idea is that undergraduates, studying on an individual trajectory (according to a target task) on one hand, with another – study in groups. In too time, each trainee has own set of key (control) tasks on special disciplines, the providing elements (blocks) of final project. As the tree of disciplines

initially is under construction, the sequence of statement of information in final qualification work it is provide with hierarchy of the sequence of statement of disciplines.

2. Algorithms of system support management when forming programs of individual trajectories

At third stage the algorithm of realization key moments of model including again entered processes is develop: definition model of competences undergraduate and a set of the previous disciplines with a possibility of further comparison in the form of a set of obligatory and variable disciplines, and formation model of individual trajectories. Main steps of an algorithm:

1. To define initial option of competence-based model of the undergraduate because of target requirements.

2. To define a set of disciplines which are beforehand master before creation of individual educational trajectory. The procedure is necessary for formation of possible communications between the previous, mastered disciplines, and a set of disciplines from which the new curriculum will be create.

3. To make a set of disciplines which surely will be in curriculum. A set of disciplines that have been in previous (studied) curriculum regarding communication with not entered disciplines is for this purpose analyzed. Besides, to include in the list of discipline which have no communications with previous and which need to begin to be studied.

If transition to the following step is carried out, then to analyze communications between disciplines with disciplines that can be included in curriculum and include disciplines which studying students have to start in this semester.

4. To make a set of disciplines which can be included in curriculum. For this purpose, it is necessary to compare the second component of competence-based model of undergraduate with initial requirements to each discipline. For disciplines, entry into the curriculum will be define upon getting into the solution of model, according to criterion function.

5. To make model which great number of unknown will be a set of disciplines of the current step.

Criterion is maximizing the sum of estimates of disciplines where coefficient – assessment in a mark form reflecting the importance of discipline for the concrete direction of preparation. The restrictions imposed on model consist of requirements of FSES: maximum and minimum quantity of hours/credits that is take away on disciplines, maximum, minimum quantity of hours/credits that is taken away on basic disciplines, maximum, and minimum quantity of hours/credits that is taken away on variable disciplines, amount of disciplines, examinations, and offsets. By drawing up model, it is necessary to correct system of restrictions taking into account disciplines that are included in curriculum on previous step.

6. To receive the decision, the target task formulated on previous step. If decision is made, following step is carried out if is not present, then algorithm finishes work on creation of individual educational trajectory because of a lack of resources.

7. To fill up model of an individual trajectory of undergraduate with purposes of disciplines which have been in curriculum. To finish algorithm execution if all requirements are met.

The plan element becomes result, and in general, individual educational trajectory is result of algorithm execution. The presented algorithm provides process of creation of an individual educational trajectory from the point of view of compliance to requirements of operating influences.

Conclusion

During work, the following results are receive:

1. The analysis current state control system of training masters in higher education institutions of Russia and Kazakhstan, analysis models of systems organization and management of training masters of profile higher education institutions focused on modern state educational standards is carry.

2. The model comparison of individual trajectories to criterion function and criteria with floating coefficients and corrected feedback target tree of trajectory agent-player is developed.

3. Algorithms of system support management when forming programs of individual trajectories on basis of mechanisms adaptation of unified field of criteria at change of external environment with use indicators of changes characteristics of agents-players are developed.

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