OPTIMIZATION OF COMPETENCE FORMATION MANAGEMENT PROCESS BY EDUCATING EMPLOYEES

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Keywords: competence-oriented approach, curriculum, KAS-complex (knowledge, abilities, and skills), selection of competences, graph theory, optimal educational management.

The article concerns solving the optimal educational management problem by moving to competence-oriented education, using graph theory and automated scheduling including optimal path of learning activity.

Competence formation in educational process is provided by basic lections, practices and other educational items which form an educational module. Content and volume of educational resources are determined by KAS-complex (knowledge, abilities, skills). Herewith one and the same discipline can take part in developing a range of competences. Therefore there are special requirements for scheduling.

The development of competences is not a gradual process. Each competence is formed during the whole education period. The course may help develop a range of competences. Any part of the course is aimed at developing a competence. The problem of educational resource allocation may be presented as a graph (see figure).

Where $R_q, q = 0, N$ level q competence;

$X = \{X_j\}$ volume of project specifications, aimed at developing a new ability (competence);

$R_i^{q,l}$ level q competence, including l-sub competences of i- link;

$Y_j^{i,q}$ volume of tasks performed (classes) within i-level by standard learning activity;

t_i^q time for new knowledge development in process for level q competence at i-link of model.

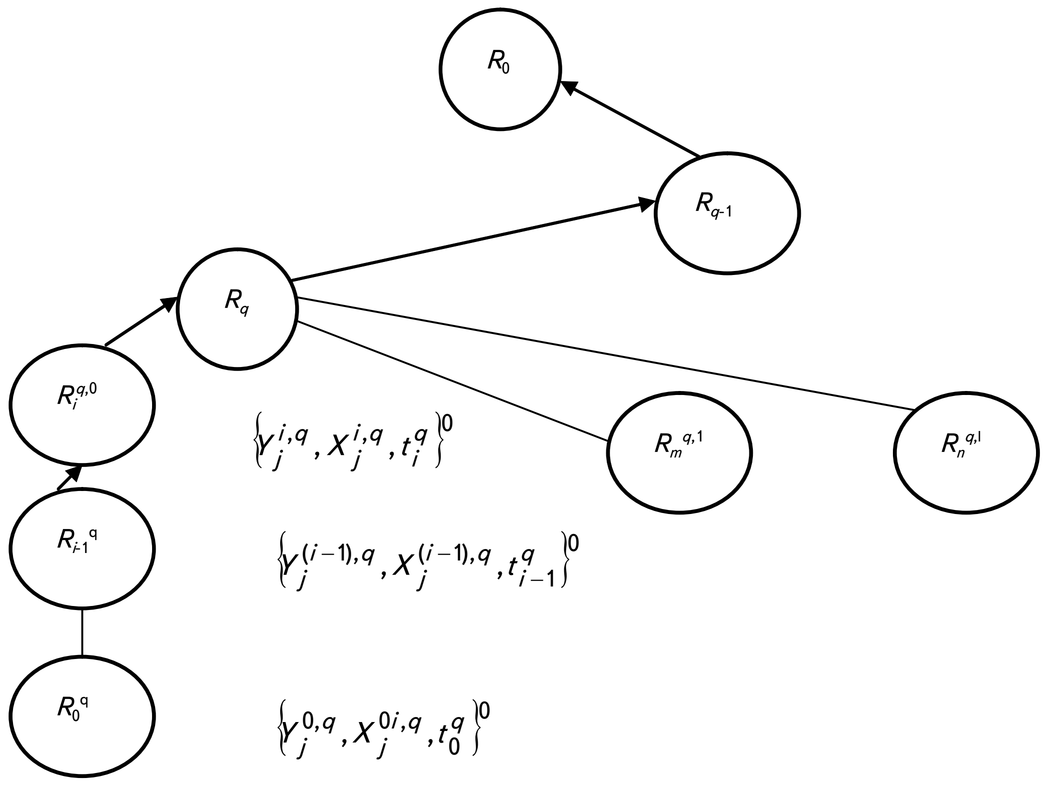

Fig. **The problem of educational resource allocation within educational process**

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We add 4 macro parameters: total volume of class hours by standard decisions *Y* and innovative decisions *X*, number of educational periods or time *T*, result of education *R* - level of the competence received. The desired variable is "educational path" $R^{\kappa,T}$.

In general, the optimal educational management problem is formed as follows: by giving total volume of tasks *Y* and *X*, which the student can perform, and time *T* for education. It takes finding a path maximizing the result *R*. Based on the results, quoted in the previous works of the author, this problem is described as follows:

$$\begin{cases} \sum_{l=1}^{T} y^{l} \exp(-\gamma \sum_{m=1}^{l-1} y^{m}) + \sum_{l1=1}^{l1-1} r^{0} x^{l1} / \\ / \exp(-\gamma \sum_{m1=1}^{l1-1} x^{m1}) \to \min_{\{(y+x)^{1,T} \mid \sum_{\tau=1} (y+x)^{\tau} = Y + X\}} \\ Y^{\tau} \le Y \\ X^{\tau} \le X \\ \tau \le T \\ \quad \sum x(i,l,3) \to \max \\ \alpha(i,j) \in R \\ \quad \sum x(i,l,11) \to \max \\ \alpha(i,j) \in R \\ \sum_{i=1}^{n} \sum_{l=1}^{m} \sum_{j=1}^{n} \sum_{r=1}^{m} k(i,l;j,r) \times \\ P(i,l;j,r) \times [x(j,r,1) - x(i,l,2)] \to \min \\ \max_{R(i,l) \in РУП} x(i,l,2) \le d \\ N \le K \\ L(s) \le KS \\ n(s) \le x(i,l,k) \wedge k(s) \ge x(i,l,2) \\ IN\ \min(l) \ge ia(i,l) + is(i,l) + \\ + ii(i,l) + in(i,l) \ge IN\ \max(l) \\ x(i,l,1) \ge n(s) \wedge x(i,l,2) \le k(s) \\ x(j,r,1) - x(i,l,2) \ge 0 \end{cases}$$

This problem may be considered an optimal educational management problem.

Trofimova O.K. Automatization of the process of making the study plans for higher educational institutions. M., 1999.

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