THE AUTOMATED SYSTEM OF THE RHYTHM ANALYSIS OF THE EDUCATIONAL PROCESS IN A HIGHER EDUCATIONAL INSTITUTION ON THE BASIS OF APRIORISTIC DATA

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Abstract: *In this article the problems of functioning algorithms development for system of the automated analysis of educational process rhythm in a higher educational institution are considered. Using the device of experiment planning for conducting the scientific researches, adapted methodologies, received by authors in the dissertational works at the decision of similar problems for continuous and discrete mass productions, there are offered variants of construction of corresponding algorithms for the automated analysis of rhythm of a higher educational institution at conducting educational process.*

Key words: *automated system; rhythm; educational process; quality*

1. Introduction

Preparation of experts with higher education in the CIS countries last 15 years is still accompanied by falling of interest to exact and engineering sciences and still a growing demand for economic and legal specialities. Planned number of students in educational groups of one specialities usually decreases, but for other specialities the number of groups and of the students in the group increase, which lead to infringement of rhythm of educational process, with all consequences following from here. First of all, it influences quality of educational process. To find variants of the automated analysis of rhythm of this or that educational process - the important and actual problem. Using technics of planning of experiment, it is obviously possible to calculate the general dispersion of rhythm factor. In the beginning, by means of criterion Kohren, performance of a hypothesis about static

uniformity of a selective dispersion is checked. Heterogeneity inside of each of steps is established. Then the size of displacement, a number of other operations is defined and then the picture of dispersion is shown. For a quantitative estimation of factor of rhythm the technique offered in [1,2][1] is used. For an establishment of mathematical dependence of a parameter of rhythm from time were drawn by analogy to sequence of actions applied in [3]. The moments of one-dimensional numbers of the distribution [4], the mixed moments paid off, factors of correlation and the correlation attitude are calculated, in the end the order, factors and directly equation of the regress, found on a way offered by P.L.Chebyshev [4] is defined. The received model can be used as a basis for construction of the automated system of the analysis of rhythm of conducting educational process by preparation of experts with higher education in modern conditions.

2. The analysis of rhythm of educational process

Let's assume, that there are rhythmical and spasmodic educational processes. Rhythmical processes are stable, the quantity of trained students and quantity of let out experts in unit of time B_f basically corresponds to in advance established plan B_p, i.e. $B_f = B_p$. Graphically rhythmical educational institutions can be presented in the form of some linear dependence (1) as shown in figure 1 and 2.

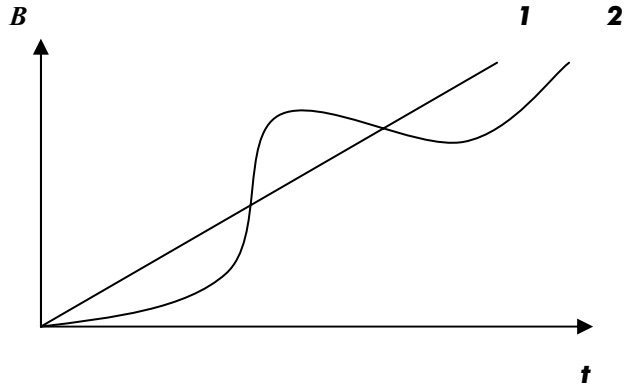

Figure 1. The schedule of dependence of quantity of trained students and graduate experts from time at rhythmical (1) and spasmodic (2) educational process

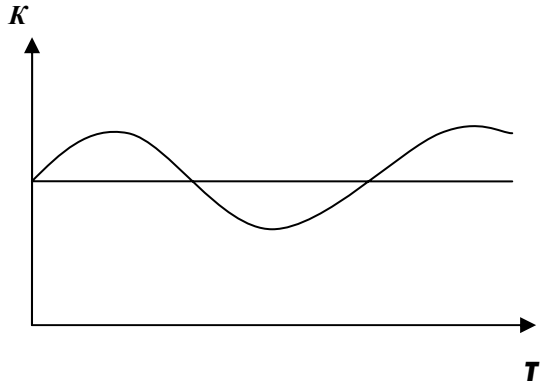

Figure 2. Dependence of factor of rhythm on time at rhythmical (1) and spasmodic (2) educational process

In spasmodic educational institutions the number of trained students and quantity of graduate experts with higher education in current of time changes under the casual law. For them deviations from planned targets, both in negative, and in the positive party are characteristic. Generally, they can be described in the form of some curves (2) presented on figure 1 and 2.

To estimate quantitatively both rhythmical, and spasmodic educational processes it is possible by means of factor of rhythm. According to [1,2,5, etc.] it is possible to define factor of rhythm K_r a parity of the sum of actual release of experts and-or quantities of students simultaneously trained in the certain period of time B_f to the general scheduled volume of release of experts B_p for the similar period of time:

$$K_r = \frac{\sum_{i=1}^{n} B_f}{\sum_{i=1}^{n} B_p} \qquad (1)$$

In view of both positive, and negative deviations of actual release of young experts and-or simultaneous training of students on corresponding specialization B_f from scheduled B_p, factor of rhythm suggest to count under the following formula:

$$K_r = 1 - \frac{\sum_{i=1}^{n} \left| B_p - B_f \right|}{\sum_{i=1}^{n} B_p} = 1 - \frac{\sum_{i=1}^{n} a}{\sum_{i=1}^{n} B_p} \qquad (2)$$

where, $a = | B_p - B_f |$ - absolute (both positive, and negative) a deviation of scheduled and actual release of experts and-or quantities of students simultaneously trained during the certain period of time, n – number of the periods for which rhythm of educational process (educational weeks, semester, educational years) is analyzed.

The factor of rhythm expressed by means of formulas (1) and (2) is equal to unit at rhythmical work of an educational institution and less then one all other cases.

By development the offered in present article system, there is a necessity to consider possible fluctuations of educational process which can lower its quality considerably.

It is possible to consider these fluctuations if in corresponding algorithms calculation of factor of rhythm will be included. However, resulted in [4] formulas for definition of factor of rhythm are not so convenient for their account in corresponding algorithms because of inclusion in formulas (1) and (2) post value B_f for definition of factor of rhythm which are not always convenient [3]. Positive results for calculation of factor of rhythm on the basis of aprioristic data have been received in [3] which too for the present have not been published, and as object of research there were data about production of the enterprise with discrete mass character of manufacture. Therefore were required additional researches for acknowledgement of an opportunity of use received in [3] results and for definition of factor of rhythm on the basis of aprioristic data about a course of educational process in a higher educational institution.

For this purpose were used data about number of students of one of educational institutions on the beginning and the end of each educational semester, in an autumn and spring semester, number of graduates for the period with 1998 up to 2002 .Parameters B_f were compared, also as well as in [3], with plan B_p (a defined contingent of students accepted on the first rate) by means of the following formula

$$K^1 = \frac{B_f}{B_p}$$

The variable K^1, received in relative units, has appeared convenient for carrying out of corresponding researches with the purpose of definition of aprioristic factor of rhythm of functioning of a higher educational institution. Values K^1 are accepted as initial for construction trend components, describing the tendency of change of quantity of graduates in time, i.e. rhythm of educational process on the basis of aprioristic data.

For definition of dispersion of trend components it is convenient to take advantage of methods of the dispersive analysis [4] which represent methods of processing of the experimental data, allowing to check up a hypothesis about presence of effect, inserted by the investigated factor, by allocation and comparison of two dispersions: a dispersion defined by effect of change of levels of the investigated factor, and a dispersion describing distance, connected with a mistake of experiment.

Considering, that planning and the control over an educational institution is conducted on results of each semester, academic year, on each release in a cut of each of educational groups, it would be logical to analyse a share of a dispersion at each stage in the general dispersion by means of the device of step planning experiment [4] about what it was already marked in section 1 of present clause.

3. Conclusions

Calculation of factor of rhythm from time in an educational institution on the basis of aprioristic data, on quantity of trainees, on a contingent of graduates, and its use, for construction of algorithms of the automated system of the analysis of rhythm during preparation of experts, enables more precisely to predict behavior of a course of educational process during the subsequent periods of time, more precisely to count an academic load of teachers, allows to reduce financial losses of an educational institution, allows to raise quality of educational process as a whole.

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