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ANALYZING THE EFFECTIVENESS OF UNIVERSITY EDUCATIONAL SYSTEM DEVELOPMENT

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Key words and phrases: mathematical model of value-oriented core; modeling of university educational system; university educational system; value-oriented core.

Abstract: The paper describes the construction of mathematical model of value-oriented core of the university educational system and its application for qualitative analysis of the effectiveness of university educational system development.

The theory of educational systems is one of the most interesting directions in modern pedagogy. The educational system is a prerequisite for the effective social development, in other words, it creates the conditions for the effective development of value orientations of the organization and its members. Based on the conception of social education formulated by A.V. Mudrik's scientific school, social education is interpreted as a process of relatively controllable socialization in educational environment. Any educational organization, including university can be regarded as this kind of environment. One of the most effective tools of social education is emerging individuals in the subculture of the educational organization and acquisition of values and meanings of its value-oriented core, which determines the priority directions in social education. In fact, positive nature of social education is manifested in exchange, production and acquisition of subculture values, in other words, individuals self-determine their values and orientations in the subculture of the educational organization.

In addition, university educational system has its educational functions, i.e. it influences relatively controllable socialization of students. The degree of this influence depends on the importance of lecturers to students. Interaction with lecturers as significant elements of university educational system causes students to acquire the values of this educational system [1, p. 14].

The effectiveness of social education depends on the effectiveness of educational system of any educational organization. One of the ways of improving its effectiveness is pedagogical modeling. The analysis of pedagogical and sociological literature brings us to the conclusion, that the problem of modeling of educational system is quite complicated and multifaceted (L.I. Novikova, V.E. Stepanov).

The model of university educational system can be described as a two-level semiotic system, which is a part of modeling process; at the same time, modeling of university educational system can be described as a method of designing the analogues of the modeled object; this approach enables to examine various phenomena and processes inside and outside the system by creating the options of managerial decisions

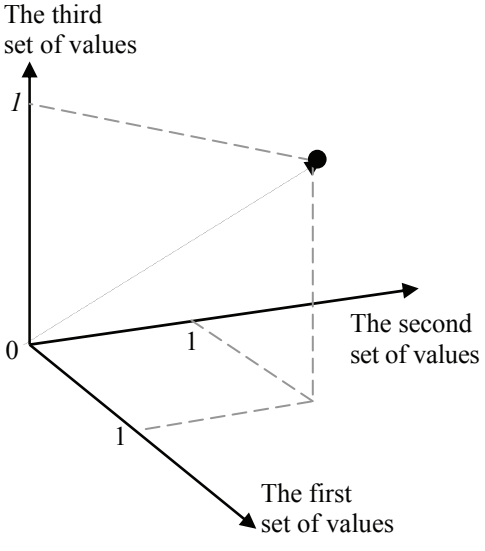
aimed at increasing the effectiveness of university educational system. Modeling is organized as a multi-step process.

On the basis of multi-level modeling, the university educational system can be described as a two-level model (I.P. Lebedeva, I.D. Pekhletsky, V.E. Shteinberg) with each level as a relatively independent model. The external level of this two-level model presents the object of modeling as an integral whole and can be described as a logical model of university educational system. The internal level forms the systemic level of the object of modeling and can be described as a mathematical model of value-oriented core of the university educational system. This model is the basis for further formalization of logical model. At the same time, mathematical model of value-oriented core of the university educational system can perform diagnostic functions.

As a result, it caused the need for searching an optimal mathematical object that can reflect the status of the integral system and changes inside this system. *N-dimensional* vector space R^n has been selected as a mathematical object [2, p. 32–56; 3, p. 67–87].

In the course of modeling the characteristics of specific values of value-oriented core of the university educational system have been attributed to the objects of mathematical structure (space vectors). As a result, the elements of the examined space R^n are vectors X_i, where i is the ordinal number of the object or the value of the value-oriented core and n was the number of values (space dimension). The vectors of the initial group of students are the points of this space. The coordinates of the points describe numerically to what extent the students adopt the specific attributes of the values of the university educational system. It should be noted, that the set of values intrinsic of the value-oriented core of the university educational system depends on the type of university educational system [4].

As the basic empirical methodology we used the theory of personality value orientations developed by M. Rokich to determine the required set. The qualitative analysis of the research findings enables to evaluate the hierarchy of values and meanings of the students as personality value orientations reveal the degree of students' involvement in the university subculture. The dimension of the space formed by the vectors correlating with the values has been calculated by the factorization of correlation matrix between the scales of values intrinsic of the meaningful elements of the educational system, i.e. lecturers. As a result, each vector forms the subspace of secondary correlating values of the value-oriented core of the educational space.



Mathematical model of value-oriented core of the university educational system

The final mathematical model of value-oriented core of the university educational system can be described as three-dimensional value-oriented vector space with axis coordinates correlating with the groups of values of value-oriented core of the university educational system. The coordinates of the space points show to what extent the students acquire the attributes of the specific values of the university educational system. Figure shows the mathematical model of value-oriented core.

The exponent on each vector of the three-dimensional space is the arithmetical mean of the exponents of multi-dimensional space correlating with each cluster of the revealed values.

The point in the space with the coordinates (1; 1; 1) correlates with the maximum value acquisition of the value-oriented core of the university educational system by the lecturers and is called the reference point of value acquisition of the value-oriented core of the university educational system. The dynamics of changes in value orientations of students in the process of their socialization in the university is reflected in the individual trajectory of university students as elements of its educational system. At the same time, the effectiveness of the system is measured by the approximation of the final point of individual trajectory to the reference point (1; 1; 1); it enables to track the changes in the educational system and plan control actions.

The practical value of the constructed mathematical model of the value-oriented core of the university system is in ensuring quantitative and qualitative diagnostics of the described system. On the whole, the two-level model of the university educational system enables to trace some aspects of the system development and control and make them available for further planning of control actions on the basis of the qualitative analysis.

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Анализ эффективности развития воспитательной системы вуза

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Ключевые слова и фразы: воспитательная система вуза; математическая модель ценностно-смыслового ядра; моделирование воспитательной системы вуза; ценностно-смысловое ядро.

Аннотация: Описан опыт построения математической модели ценностно-смыслового ядра воспитательной системы вуза и применения ее для проведения качественного анализа эффективности развития воспитательной системы учебного заведения.

Analyse der Effektivität der Entwicklung des Erziehungssystems in der Hochschule

Zusammenfassung: Es ist die Erfahrung des Aufbaues des mathematischen Modells des Wertsinnkernes des Erziehungssystems der Hochschule und seine Verwendung für die Durchführung der Qualitätsanalyse der Effektivität der Entwicklung des Erziehungssystems der Bildungsanstalt beschrieben.

Analyse de l'efficacité du développement du système éducatif de l'établissement de l'enseignement supérieur

Résumé: Est décrite l'expérience de la construction du modèle mathématique du noyau de sens et de valeur du système éducatif de l'établissement de l'enseignement supérieur et de son application pour la réalisation de l'analyse de l'efficacité du développement du système éducatif de l'établissement de l'enseignement supérieur.

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