USE OF MODELING METHODS IN PEDAGOGICAL RESEARCH

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Annotation

The analysis of the use of mathematical modeling methods in pedagogical research is carried out. The definition of mathematical modeling in pedagogy has been clarified, based on the specifics of the subject area. The main stages of the formation of mathematical modeling methods in accordance with the need for automation of the pedagogical process are highlighted. And also the areas of representation of the pedagogical object by methods of mathematical modeling are highlighted.

Keywords: mathematical modeling, mathematical methods in pedagogy, educational process.

It is possible to distinguish the stages of mathematical modeling:

1. Definition of the modeling object.
2. Definition of the purpose of modeling.
3. The choice of mathematical modeling apparatus.
4. Selection of variables, parameters, measurement scales, evaluation criteria.
5. Defining relationships between variables.
6. Selection of restrictions.
7. Model research.

The subsequent stages are associated with the study of the stability and adequacy of the model, with the practical implementation and implementation of the simulation results. The type of mathematical model depends on the real object, the objectives of the study, the required accuracy and the choice of the researcher. Any mathematical model describes a real object only with some degree of approximation to reality.

The solution of complex management problems in the educational system is currently almost impossible without preliminary modeling of learning processes. The choice of the type of model is determined by the nature of the process and the task of management. The main types of tasks solved by modeling in the educational system are:

1. Study of the current state of the educational process. For existing models, parameters are determined and values of output parameters are calculated, as well as relationships between individual parameters and stages are determined.

2. Forecasting the state of knowledge of the student and the group.
3. Optimization of educational process management.

Mathematical modeling is a multifunctional didactic tool, objective due to the use of mathematical models as a mathematical basis.

In the process of developing approaches to the application of mathematical modeling methods in pedagogy, the following stages of the formation of mathematical modeling methods can be distinguished in accordance with the need for automation of the pedagogical process:

1) appearance in pedagogy;
2) development of individual methods and directions;
3) comprehension and generalization of the possibilities of mathematical modeling in pedagogical science. Taking as a basis the classifications used by economics and psychology, we obtain the following classifications of models used in pedagogical research:

1. According to the general classification of mathematical models:
1) structural (non-metric);
2) functional (metric);
3) structural and functional (mixed).
2. For the intended purpose:
1) theoretical and analytical (general scientific);
2) applied (special).
3. According to the degree of idealization:
1) descriptive;
2) regulatory.

Mathematical models also perform a predictive function, since the quantitative or structural relationships fixed in them open up the possibilities of planning pedagogical activity, building prospects for the development of the pedagogical system, taking into account the conditions for which the mathematical model is built. The implementation of the predictive function of a specific mathematical model is associated with the extrapolation of trends based on statistical criteria using various forecasting methods. The main types of mathematical models used in research and management in educational systems are:

Analytical dependences of the main parameters characterizing the process (first of all, the result) of learning on time. Since there is always a human factor in training, the effect of which is of a complex psychophysical nature, analytical models, as a rule, are probabilistic or statistical in nature. This increases the adequacy of the model to the original system by taking into account essential properties and relationships that cannot be deterministically described. Analytical dependencies have a number of advantages over other types of models. Firstly, developed mathematical methods allow us to transform expressions to obtain the

most convenient type of model characterizing the behavior of the system under study. Thus, it is possible to conduct an analysis in general, to determine the optimal ratios of parameters for effective management. Secondly, when substituting numerical values of parameters, it is possible to control the adequacy of the model. At the same time, however, for effective use Mathematical modeling is actively used in modern educational systems. Currently, this is facilitated by the widespread use of computer technology, which allows solving the tasks of managing the educational process on the basis of developed mathematical models of various types in an operational mode

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