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Modeling of the System of Professional Training of Physical Education Specialists in Pedagogical Universities

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ABSTRACT

The pedagogical system of professional training of future specialists in physical education in the process of university education belongs to the type of complex systems. The article presents a theoretical analysis of modeling the system of professional training of physical education specialists in pedagogical universities. The authors set out in detail various interpretations of the modeling of pedagogical systems. Implementation of modern models of immersive pedagogical technologies for training future specialists in physical education.

The scientific method for determining the characteristics of objects is the modeling method as one of the design methods. The authors believe that using the advantages of the modeling method requires understanding the essence of the prerequisites underlying this method and its content.

Further improvement of the research on the parameters of the pedagogical system of professional development of future specialists in physical education in the learning process is based mainly on the study of the following types of relationships between elements and subsystems: correlation (between random events and variables); functional (between subsystems, which are determined by the quantitative influence of changes in the characteristics of one subsystem on changes in the characteristics of another); causal (between events).

From this point of view, a pedagogical system is characterized by purposefulness. When modeling the system of professional training of future specialists, purposefulness requires researchers to pay attention to the goals and tasks that the specified pedagogical system should solve to achieve the necessary correspondence between them.

1. Introduction

The study of scientific sources (1-5) indicates that the method of modeling at the present stage of development of science has become widespread in research works, taking into account its epistemological functions, namely: theoretical (a specific image of reality (model), practical (a means of the scientific experiment), and formative (a prototype of the

future state).

It should be noted that the concept of "modeling" combines the content of the terms "imitation" (from Latin imitation) – imitation of someone and something and "model " (modulus – measure, sample) – a substitute object, which in certain conditions can replace the original object, reproducing the properties and characteristics of the original (2, 6).

Analyzing the modern theory and methodology of teaching management at a university, it can be argued that at the moment, the modeling of various specific operations in sports activity has not been sufficiently studied and developed, which is a very important and complex problem.

To solve the problem of effective implementation of immersive pedagogical technologies for training future specialists in physical education in higher education institutions, it is necessary to carry out modeling of the process under study and specify the essence of the concepts "model" and "modeling". Considering the concept of immersiveness, it is usually defined as immersion in certain artificially formed conditions. The phenomenon of immersion is widely studied in various sources. The main focus in the context of this problem is on the technological factors of modeling consciousness through visualization of the artificial environment.

Modeling various specific operations in sports activities is a very important and complex problem. It is particularly challenging to model mental operations since it can be extremely difficult to establish the hidden period of the perception process before the response begins.

Modeling is characterized as a method of scientific research; a basis for developing a new theory; a mechanism for determining the development prospects (18). The following functions of models are distinguished: normative, which allows comparing the phenomenon (process) with other, more studied ones; systematizing, which allows considering reality in the totality of all its manifestations; concretizing, which makes it possible to develop and justify a theory; cognitive, aimed at considering scientific and applied problems (2, 6).

There are different definitions of "model" and "modeling" in the scientific literature following the tasks that are solved by certain studies. A model is an artificially created object in the form of a diagram, table, etc., which, being similar to the object under study, displays and reproduces in a simpler, reduced form the structure, properties, interrelations, and relationships between the elements of the object under study (7).

From the standpoint of pedagogical sciences, modeling is a material or mental imitation of a really existing pedagogical system by creating special analogs (modules), in which the principles of organization and functioning of this system are reproduced (8).

Scholars, adapting the essence of this concept to a specific branch of a pedagogical science, define a model as a schematized image of a phenomenon, process, or object in nature or society that replaces the subject of pedagogical reality or as a prediction and means of implementing an original idea, a means of achieving the goals and objectives of the program since it answers the question of what to do and how to do it.

According to the authors (9, 10), a model acts as an analogy and is an intermediate link between the proposed theoretical propositions and their verification in the real pedagogical process.

We agree with the statement that creating a model in the study of pedagogical processes is the best method that provides certain information about the processes occurring in the so-called "living systems". It reflects not only the relationships of its elements but also helps to predict their development. Considering that pedagogical processes are constantly updated and adjusted following the needs of users and society, a model makes it possible to see prospects and take into account risks. Its dynamics consist in the ability to reflect changes that characterize the socio-cultural dynamics.

2. Methods

In our research, modeling was understood as an activity that creates a model for the effective implementation of pedagogical technologies for training future specialists in physical education. This model was considered as a simplified visual-graphic image of a certain system of education – an interrelated aggregate of organizational and methodological activities to ensure the effectiveness of the introduction of pedagogical technologies of training of future specialists in physical education, as well as didactic conditions that enhance the effectiveness of this process and are implemented sequentially and step by step in the educational process.

The expediency of modeling was determined by the need for a clear definition of the ways and logic of the use of pedagogical technologies for the professional training of future physical education specialists in a pedagogical university.

Indicators of their functional ability should be taken into account in the process of creating a model, namely (10): inherency, simplicity, and adequacy. Inherency allows establishing a measure of the consistency of the created model with the environment in which it will function and the specified adaptation of the environment to it through interfaces. Simplicity, as a mandatory quality of the model, will ensure its clarity, bring it closer to the modeling reality, and make it easy to use. Adequacy indicates sufficient completeness of a certain phenomenon to the extent that it allows achieving the goal and is accurate and real. Thus, the identified requirements ensure the establishment of relationships between the environment, which expresses a measure of consistency with the subject creating the model and the object of modeling (11).

3. Results

Research of scientific sources showed that the construction of models takes place according to a certain algorithm, but different sources offer a different number of stages, although their content is approximately the same.

For example, in studies (11, 12), the authors defined the structure of the modeling process using the following algorithm: a) problem statement; b) creating or selecting a model; c) model research; d) transferring knowledge from the model to the original. This method is based on a synthetic approach that allows identifying complete systems and investigating their functioning. Researchers consider its main advantage to be the integrity of information.

We take into account the results of research conducted by a group of researchers (2, 13) who believe that effective pedagogical modeling provides five main stages: studying the problem of constructing a model and defining the functions of the object under study, its place and role in the education system; setting tasks to clarify the components of the model, its effective functioning and diagnostics; highlighting the necessary components of the model and determining the criteria for their diagnosis; establishment of relationships (logical, functional, semantic, technological, etc.) between the previously defined components of the model; developing thea model and predicting its dynamics.

We agree with the statement of researchers (14, 15) that none of the proposed models gives a complete picture of the object under study and cannot accurately predict its development. Therefore, a complex of models should be built that describes various factors of the object under study.

Models have been used and continue to be widely used as a means of professional preparation and training (16). Pedagogical science has long recognized the importance of training a future specialist in professional skills in a higher education institution using the modeling method (17, 18).

The use of the simulation method makes it possible to conduct controlled experiments in situations where experimentation on real objects would be almost impossible (16). Immediate experimentation with the pedagogical system of professional training of future specialists in physical education in the process of studying at a university usually consists in varying some of its parameters while maintaining all other parameters unchanged, observing the results of the pedagogical experiment.

Therefore, the model can contribute to the interpretation of one of two main goals: either to describe, if the model serves to explain and better understand the object, or to reproduce the characteristics of the object, which determines its behavior (17, 19).

Pedagogical models help to organize unclear or contradictory concepts and inconsistencies in scientific research (17, 20). Therefore, a model of the pedagogical system of professional training of future specialists in physical education helps us to identify interdependencies, time relationships, necessary measures, and resources. A well-constructed model forces one to organize their ideas and evaluate and verify their validity.

A model of the pedagogical system of professional training of future specialists in physical education will help us eliminate inaccuracies, offering us the best and reasonable ways to coordinate the development of professional competence of future specialists. A model makes the overall structure of the training process more clear and reveals important cause-and-effect relationships. We generalize scientific materials obtained as a result of research and combine them into a single database to model such a system.

Pedagogical modeling is a very broad concept that is of great importance for the design and functioning of pedagogical systems. Pedagogical modeling is the process of constructing a model of a pedagogical system and setting up experiments on this model to either understand the behavior of the system or evaluate the functioning of this system (21, 22). Thus, the process of pedagogical modeling includes both the construction of a model of the pedagogical system and its implementation to study the problem of scientific and methodological support for the process of professional training of future specialists in physical education. A model of the pedagogical system of professional training of future physical education specialists in the process of university education is a tool used for prediction and comparison, which allows predicting the consequences of alternative actions in a logical way and confidently indicating which one to give preference to.

Pedagogical modeling is mainly based on pedagogical processes. In the context of our research, this refers to the fact that modeling professional activity in the process of professional training of future specialists in physical education provided the development of professional competence, which was an indicator of the corresponding professional development (23).

Pedagogical modeling is a very broad and well-defined concept that is important for those responsible for the design and operation of educational systems. In our opinion, pedagogical modeling is the process of constructing a model of a pedagogical system and setting up experiments on this model to either understand the behavior of the system or evaluate (within the limits imposed by a certain criterion or set of criteria) various strategies that ensure the functioning of this system.

Thus, we understand the process of pedagogical modeling as a process that includes both the construction of a pedagogical model and its analytical application to study a particular problem.

Aiming to describe the behavior of the pedagogical system, build theories and hypotheses that can explain the pedagogical processes that are being investigated, and use these theories to predict future professional activity, that is, those influences that can be caused by changes in the system or changes in the way it functions, pedagogical modeling can be considered an experimental and applied methodology (24).

4. Discussion

One of the main directions necessary for the effective solution of complex professional tasks is the construction and use of a model of the pedagogical system of professional training, taking into account the dynamics of the development of professional competence of future specialists in physical education (14, 25).

The main directions of building a model of the pedagogical system of professional training of future specialists in

physical education in the process of university training will be the integrity of subsystems, unidirectional functions, and the adequacy of pedagogical actions (15, 26).

The integrity of the subsystems of the pedagogical system is a set of components (elements), the interaction of which is aimed at preserving and developing the entire pedagogical system in the required direction and, in the context of our research, at the formation of professional competence of future physical education specialists in the process of professional training.

Each subsystem performs a specific function, and the pedagogical system is aimed at achieving a specific goal. Therefore, it is fair to assume that the pedagogical system of professional training of future specialists in physical education in the process of studying at a university will be such a pedagogical system, the subsystems of which perform functions for achieving, preserving, and developing the highest results. However, the share of subsystems' participation in achieving the goal will vary. Also, the interrelation of elements of subsystems should be differentiated by the strength and direction of action. These indicators depend on the degree of the determinism of the function of subsystem elements in achieving final or intermediate results (27, 28).

The use of models is important, but it does not in any way exhaust the goals of modeling. Building a functional model can also be an effective means of understanding the regularities of the process of professional training of future specialists in physical education. When modeling the proposed pedagogical system, we used a combination of several models from the varieties mentioned above (a functional model of professional training of future trainers, a model for the development of professional competence of future specialists). A pedagogical system or subsystem can be represented in different ways, which differ significantly in complexity and detail. In our case, as a result of research, several different models of the same pedagogical system were used. In a specific case, in the process of professional training of future wrestling coaches, we used the modeling method as an indirect approach to the study of an object by replacing it with another object. Therewith, we assumed that the model represents a complex system that includes simpler systems with properties similar to those that make up the subject of research in the original complex system (29). At the same time, the research used conceptual modeling, which is the development and use of models formed by pedagogical observation in the learning process and observation of objects in the form of an image endowed with certain structural properties and reflecting the mechanism of image functioning (30). The use of conceptual modeling allowed building algorithmic conflict structures of tactical and technical complexes of freestyle wrestling, including game modeling based on the performance standards of tactical and technical complexes, modeling of conflict interaction in combinations, and game modeling of wrestling complexes.

5. Conclusion

Experimental verification of the effectiveness of game modeling of tactical and technical complexes of freestyle wrestling allowed convincingly showing the effectiveness of the proposed method in intra-group comparison in the experimental group and inter-group comparison with the control group. The main increase in professional modeling skills was formed due to the formation of students' skills to identify the conflict interaction of wrestlers.

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