Vector modeling in pedagogical research on problems of physical education and sports

UDC 37.037.1+796

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Received by the editorial office on 13.05.2024

Abstract

Objective of the study was to describe the capabilities of the vector modeling method in pedagogical research in physical education and sports.

Results and conclusions. The article presents a description of the vector modeling method. An overview of the dialectical-logical algorithm of the vector modeling method is given. The systematization of pedagogical models of physical education has been carried out. Health-adaptive, socially-oriented, personality-oriented and sports-recreational models of physical education are identified and analyzed. Their specific features, advantages and limitations in the practice of physical education are described. The prospects for using the vector modeling method in humanities research are shown.

Keywords: *vector modeling, dialectical-logical algorithm, categorical models, pedagogical models of physical education.*

Introduction. Pedagogical research on the problems of physical culture and sports is carried out at the intersection of humanities and natural sciences and involves a methodology of scientific research with the widespread use of interdisciplinary tools adequate to the objectives of the research [4].

It is generally accepted that a scientifically based choice of methods ensures a clear logic of the study and the reliability of its results. An analysis of dissertations on pedagogical problems of physical culture and sports showed that the arsenal of theoretical and humanitarian methods of scientific knowledge among applicants for academic degrees is not large [3, 5].

The theoretical research methods used by the authors do not always lead to a logically structured constructive-critical analysis of domestic and foreign scientific sources, showing the degree of development of the problem, the presence of «knowledge of ignorance» and «blank spots» in science that need to be investigated. The use of methods such as abstraction, concretization, modeling, classification and systematization in scientific work often causes difficulties for authors.

One of the key categories of modern cognitive theory and research practice is modeling, which is most often defined as a set of techniques, logical operations of cognition and practical actions performed to construct and study a model of an object for the purpose of its thorough study [4, 9].

Objective of the study was to describe the capabilities of the vector modeling method in pedagogical research on the problems of physical education and sports.

Results of the study and discussion. The vector modeling method shows how the content of logical operations can change within the framework of formal and informal logic. The method is based on an abstract comparison of the properties of various objects, that is, establishing their similarities and differences and identifying paired reflexive categories.

The method «... allows you to get «inside» a phenomenon and go «outside» (internal - external, essence - phenomenon) or determine the strength of the influence of one on the other (cause - effect, necessary - accidental)» [11].

The dialectical-logical algorithm - a set of rules that allows you to build categorical models of objects, was proposed by D.V. Pivovarov (1993). «To achieve the goals of cognition, the categories of dialectics and other paired categories of a high degree of generality can be analyzed as stratagems of action and technological chains can be built from them. The algorithm consists of three (or more) steps, and technological chains can take the form of a tetrad, an ennead, or an equation from the enneads» [10].

D.V. Pivovarov showed how in a holistic object of study it is possible to isolate paired categories (opposites) and the general measure of their unity to create a holistic idea of the object, namely: a tetrad around the dimensional category «body», then around a categorical square - a rhombus, the vertices of which became the vertices of a triangle , erected on the side of a square, connected by diagonals. Moreover, the initial goals of the analysis determine all its procedures. Since the opposites acted as sides of one object, they also had common features, and therefore there was a specific identity between them, in contrast to formal logical identification, taking into account their differences (Fig. 1).

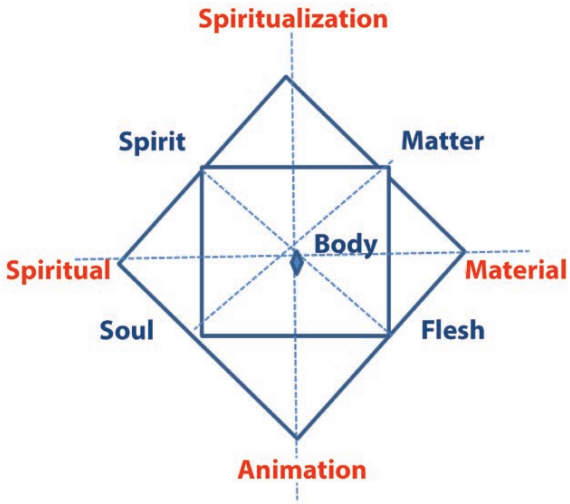

Fig. 1. Ennead - a three-dimensional model of a person according to D.V. Pivovarov (1993)

The presented Ennead helps, through simplification, to understand the origin of the three models of man (one-dimensional, two-dimensional and three-dimensional). The types of transformed corporeality are indicated at the vertices of the rhombus (Fig. 1).

Much later than Golubeva N.A. identified «heuristic possibilities of disymmetric analysis in the study of structural features and mechanisms of transformation of objects... Factors that determine the disymmetric lability of objects related to the social, cognitive and artistic spheres are considered» [2].

Artificially created models in pedagogical research are only diagrams that reflect the authors ideas about these phenomena. The vector modeling method allowed for cross-cultural analysis and systematization of pedagogical models of physical education.

Since the study of a person «from the inside» presupposes the comprehension of the modes of his spiritual and physical existence, and the consideration of a person «from the outside» is based on the interpretation of his relations with the surrounding world of nature and culture, we rely on the idea of subject integration of G.G. Natalova suggested that the real set of models of physical education is determined by their anthropological and ontological components, namely, one or another combination of two interrelated and interdependent vectors: «body-spirit» and «nature-culture» [7].

The above was the basis for identifying health-adaptive, socially-oriented, personality-oriented and sports-recreational models of physical education, extreme in their manifestations and differing in target orientations and mechanisms for achieving goals (Fig. 2) [8].

The health-adaptive model of physical education is inherently consonant with the nature-centric model of pedagogical activity (L.A. Belyaeva, I.G. Fomicheva) and fits into the biologizing direction of personality development, according to which a person is born with a certain set of qualities that manifest themselves in the process of his biosocial development , the task of training and education is «to follow human nature» [1, 13].

Within the framework of this model, the goal of physical education is to improve health, achieve normal age-sex physical development and general physical fitness, create an individual morphofunctional and motor base necessary for a person's adaptation to natural and social conditions of life.

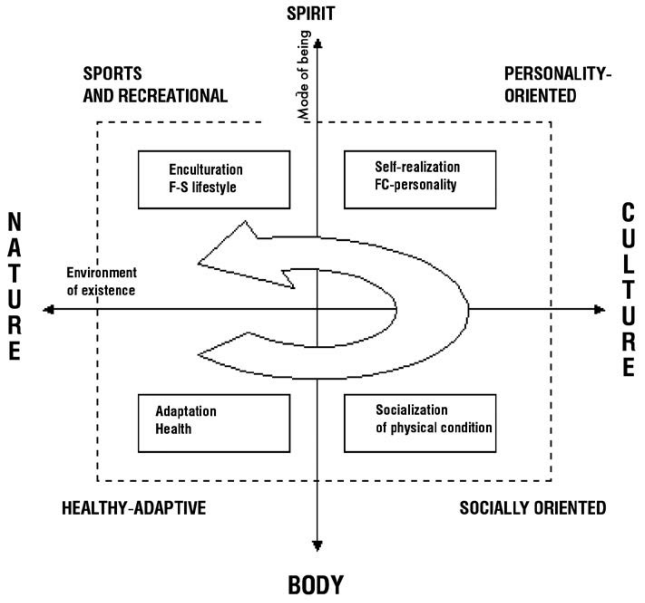

Fig. 2. Models of physical education

The socially oriented model of physical education is based on the sociological direction in the theories of personality development (classical conditioning, social learning), according to which the main influence on the formation of the personality and its behavior, regardless of natural inclinations, is organized by educational influences. The goals of socially-oriented physical education are determined based on the needs of the state and society. The educational process within the framework of this model takes the form of general physical preparation of a person for life in general and military-applied, sports-applied, vocational-applied training, taking into account the specifics of his activity for successful socialization in society.

The personality-oriented model of physical education is based on humanistic ideas in the theory of personality development and is consonant with the anthropocentric model of pedagogical activity (L.A. Belyaeva, I.G. Fomicheva), within which the main emphasis is on the formation of a holistic person, his self-realization through the development of subjectivity , abilities for goal setting and self-determination, harmonization of spiritual and physical potential. The target within the framework of this model is the formation of physical culture of the individual through the creation in the environment of an educational institution of conditions for mastering the values of physical culture based on the construction of elective trajectories of physical education and self-education, pedagogical support and accompaniment.

The sports and recreational model of physical education is based on the ideas of ecological psychology, or more precisely on the eco-behavioral studies of R. Barker, Willems, who proved the existence of «behavioral settings» and stable patterns of behavior tied to them, as well as the theory of possibilities of J. Gibson, according to which, the active principle of the subject mastering his living environment is emphasized, which confirms the idea of P.F. Lesgaft about the significant influence of the environment on the upbringing of a child [6, 12].

The semantic core of this model is variable sports and recreational activity, which, on the one hand, operates within behavioral settings according to the specifics of the physical environment (sports grounds, courts, balls, nets, etc.) and is regulated by the rules of sports governing the behavior of its participants, and on the other hand, it provides a range of opportunities for subjects to voluntarily choose the type, place, and mode of activity.

The goals of the sports and recreational model are related to the formation of a physical culture and sports lifestyle and physical culture and sports competencies of the younger generation for inculturation in the modern sociocultural environment. Its essence lies in the indirect management of the physical education of children and youth through the construction and enrichment of a sports environment that creates conditions and provides opportunities for personal self-expression.

The described models of physical education in real practice do not always exist in ideal terms, but interpenetrate one another, complementing and compensating for the specific shortcomings and limitations of each, which is quite justified in the conditions of variable education, but requires certain rules for their coordination [8].

Conclusions. The vector modeling method can complement mathematics and formal logic. It has great prospects for application in humanitarian research on the problems of physical culture and sports, provided that the dialectical-logical algorithm is adapted to specific material and is carried out on the basis of a careful selection of categorical pairs and combinations, discarding meaningless definitions.

Maintaining the priority of humanitarian specifics in research on the problems of physical culture and sports, in our opinion, is possible with a holistic consideration of man in the unity of modes of being - bodily, mental and spiritual and the environment of being

- nature and culture, based on an «organic combination of value-semantic and logical -epistemological approaches».

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