

THE PRIMARY SCHOOL FUTURE TEACHER COMPETITIVENESS FORMATION BY MEANS OF PEDAGOGICAL MODELING

Modern society needs a teacher able to build his life and professional trajectory in constantly changing conditions. For this purpose, the higher pedagogical educational institutions should reorient to another system of teacher training objectives in the field of elementary education. In our opinion, the readiness to perform basic production functions and personal and professional qualities should become its components, the availability of which guarantees the professional success and positively distinguishes the expert among others, less competent. Future teachers of elementary school aware of the importance of their professional duties, having mastered the various technologies of their implementation, build, transform and explore models of different pedagogical systems, that means, they carry out pedagogical modeling.

Key words: *competitiveness, model, types of models, pedagogical modeling, pedagogical technology, integrative-synergetic model.*

Pedagogical innovations have the leading role in the future elementary school teacher competitiveness forming in the field of education at the present stage of the market relations development. The transforming processes state higher demands to the professional training of a modern teacher in the field of primary education as a creator of the educational process in general educational institutions (HEIs), able to succeed in production activities, equipped with the latest methods and technologies of teaching, among which the pedagogical modeling takes the central place.

The concept of "pedagogical modeling" is widely used by scholars and practitioners. However, most authors, according to our observations, justifying the classification of pedagogical models and the process of their creation avoid the direct definition of this concept. One can assume that the reason is in its complexity and multilevel. The most widespread formulation of the researchers V. Budanov, O. Dakhin, M. Kataeva and others describe the specific educational (pedagogical) models of different levels of the hierarchy. A. Tsimbalar, V. Shtoff, A. Semenov, A. Verbenets interpret the definition of the very concept of "modeling" as a study of objects, phenomena and processes with the help of their models. In scientific works the researchers explain the concept of "model" as "an artificially created object in the form of circuits, tables, drawings, etc., which, being similar to the object under study, reflects and reproduces the structure, properties, interconnections and relations between the elements of the investigated object in a simpler, diminished form, the direct study of which is associated with some difficulties, high costs of means and energy, or simply unavailable, and thus facilitates the process of obtaining information about the object of interest" [5, p. 193]; "System of elements, objects, reproducing certain parties, connections, functions of the subject of research" [6, p. 107]; "Any imaginary sign or material image of the original: the mapping of the objects and phenomena in the form of descriptions, theories, schemes, drawings, graphs. The model is a representative, a substitute for the original within its cognition or in practice" [2, p. 24].

Basing on the analysis of the scientific works and our own research, we believe that the specificity of the preparation and activity of the future elementary classes teacher can be guided by the definition we have developed: "Pedagogical modeling is the construction, transformation and research of models of various pedagogical systems."

Having considered the psychological-pedagogical and philosophical literature on modeling, we came to the conclusion that the pedagogical phenomena and processes (pedagogical systems, pedagogical activity, educational process, pedagogical situations, interrelations of participants in the pedagogical process, etc.) can be its objects.

The purpose of this article is to identify the objects of pedagogical modeling, which serves as a structural component of the competitiveness of the future elementary school teacher.

We share the views of V.V. Lugovoi about the fact that "to display the varieties of information it is also necessary to have the distinctive types of sign systems (languages) – from the extremely precise abstract-scientific language to specific-type artistic languages. Informational languages (systems) also constitute the five partial series of sign systems" [8, p. 33].

In this regard it should be noted that the concept of "model" is species-specific in relation to the concept of "system", that is, any model is a system. Based on the research of V. Budanov, O. Dakhin, N. Masyukova, S. Smirnov and others, we can assume that the pedagogical modeling process acts as an ordered system, which

includes: the selection of certain elements forming the system; definition of connections between elements, including system-forming; identification of the structure and organization of the system; analysis of the principles of the system; study of the processes of system management; synthesis of the received information and construction of the model.

Consequently, the model as a result of simulation is also a system that should characterize the construction and operation of the simulated object. In pedagogical modeling to consider an object to be a model of another object, it must correspond to certain conditions, and the system is the key one among them.

Therefore, most researchers analyze the concept of "model" and "modeling" in the context of the system approach as "a method of scientific knowledge and practical activity, which requires the consideration of parts in inseparable unity with the whole" [12, p. 36-37].

Especially essential is the fact that "systems and processes modeling provides compression of information rejecting non-essential factors, which makes it possible to focus on the most significant elements and methods of their interaction, that is on those components of the system and those connections and relations, that to a large extent influence its quality and the prospects development" [3, p. 4].

Our research shows that domestic and foreign scientists define different types of pedagogical models.

For example, A. Semenova, in accordance with the theoretical aspects of the paradigm modeling concept of the future teachers professional training in the educational space of a pedagogical educational institution, defines such model-concepts [10, p. 166-167]:

- a type of idealized personality-professional paradigm (prognostic model of person-professional paradigm);

- functioning quality evaluation of the personal-professional paradigms – the paradigms of success (functional model of monitoring);

- strategies for ensuring the quality of future specialists training (procedural model of educational route);

- cognitive-psychological barriers overcoming – mechanisms of changing personality-professional paradigms (productive model of reflexion);

- systematic quality management of future teachers' training (integration model of the study area).

In turn, the researcher M. Yakubovsky proposes to allocate several types of models [13, p. 113-118]:

- functional models that imitate the behavior of the original;

- symbol models give an opportunity to display a complicated structure in material form, to explain the interconnection of elements in the complex systems;

- conceptual models involve the development and use of models that are formed through observations in the learning process and on the object during its operation; allow us to evaluate the significance of the properties of integrity, to identify the properties of the system, etc.;

- cybernetic models are based on obtaining the relations between input and output functions for a certain phenomenon being studied without disclosing its internal structure;

- Quasi-analog models and electronic models intended for the synthesis of chains, which are models of various objects, are especially important when solving problems in the design process of large systems;

- descriptive models are the reflection of existing rules in this field, expressed by algebra or equation systems;

- the decision-making model is a complex mental activity of a person that can be defined as a choice of direction for the achievement of the goal; to describe this activity, there are both classical and behavioral decision-making models;

- fuzzy (blurred) model because of the impossibility of complete and accurate description of learning objects and situations, odd performing actions in the model proposed to use fuzzy logic, which is the most important conceptual apparatus of research training;

- logic and linguistic model of management – management of complex objects (those for which a priori information about their structure and functioning is incomplete and provides substantial inability to describe such a system of formal models);

- hypothetical models are used to systematize knowledge, the message of some element of knowledge should be such that it leads to the appearance in the structure of the Gnostics image consciousness, the corresponding gnostic operation, system elements of cognitive needs and values, reference points, as well as elements of the reflection mechanisms, the removal of the cognitive barriers-installation, response to external;

- model experiments – a special form of experiment, where the use of existing material models as special means of experimental research is used.

According to the ideas presented by R. Pyearls, O. Gorbany and R. Khliboproza, E. Lodatko suggests to allocate among the models [7, p. 11]:

- those that describe the phenomenon in the form of a hypothesis (this could be ...);

- phenomenological, which contains a mechanism for describing the phenomenon (we behave as if ...);

- those using approaches (something we consider very big or very small ...);

- those based on simplifications aimed at giving up details that can be appreciably and not always controlled to affect the result (let us omit some details for clarity ...);

- heuristic, which preserve only a qualitative similarity of reality and give a forecast only "in order of magnitude" (there is no quantitative confirmation, but for a deeper penetration into the essence of the case ...);
- based on the analogy of the phenomena under study (we will consider only some of the features ...);
- models, the basis of which is an imaginary experiment (try to refute the possibilities ...);
- those based on the demonstration of opportunities (illustrate the internal contradiction of possibilities).

The author notes "Although the given" typology "in the primary sources is presented on the basis of mathematical modeling, it makes sense to extrapolate it also to the objects of the modern socio-cultural space ... Socio-cultural objects, surpassing their complexity and social significance all the others need a qualified model research to obtain the information necessary for their effective management and individual processes with their "participation" within the framework of modern socio-cultural space".

According to O. Dahin, to describe the effectiveness of modeling a special notion of "pedagogical validity" was introduced in the pedagogy close to authenticity, adequacy, but it cannot be regarded as identical. The concept of "pedagogical validity", as the scientist explains, is comprehensively substantiated: conceptually, criterion and quantitative, since, as a rule, multifactorial phenomena are modeled [1, p. 22].

However, we should agree with the researcher that no model, even very complex, cannot give a complete picture of the object studied and predicted with the absolute precision of its development or to describe the trajectory of development is not seen as possible. That is why, at designing models, "balancing" at the limit of their completeness and validity, they see a certain perspective in constructing a set of models that describe the various factors of the development of a pedagogical system: a complex, rather than an arbitrary set of models, which leads to eclecticism, arbitrariness and chaotic description. In the design of a holistic set of models and it turns out, as the expert asserts, the professionalism of the researcher.

From the analysis of scientific papers, we see that both the content of education and educational activities are often modeling in pedagogy. The modeling methodology possession actuality for a modern teacher is connected both with the general method of scientific knowledge, and on the basis of psychological and pedagogical principles. After all, for students simulation acts as a training tool, a way to summarize the teaching material and present it in a rough form in the process of constructing different models of phenomena studied. In addition, modeling of educational material is widely used for the purpose of logical arrangement of educational material, the construction of semantic schemes, the presentation of educational information in physical form, with the help of mnemonic rules (based on figurative associations).

Specialists N. Zaprudsky, V. Budanov, A. Dakhin, M. Kataev singled out a pedagogical technique, system of methods and organizational forms of education as a didactic basis of the model

The findings of individual researchers regarding the distribution of types of models, depending on the process of their construction are also valuable for our study [4] (Table 1):

1. Imaginary: in the process of forming an ideal model from a real complex device, everything unnecessary is cut off in order to obtain a more compact and concise the description of the object; representation of the imaginary model is called a content model. By functionality and goals, content models are divided into descriptive, explanatory and predictive:

- descriptive – any description of the object;
- explanatory – allows you to answer the question: why this happens;
- predictive – describes the future behavior of the object.

2. Conceptual – determines the structure of the model system, the properties of its elements and causal relationships that are inherent in the system and are essential for achieving the goal of modeling. In other words, it is a meaningful model, in the process of formulation which the concepts and representations of subject areas related to the model are used. For example, a mathematical model is formulated using the mathematical structures: formulas, spatial forms, etc.

3. A formal model is the representation of a conceptual model through formal languages. Such languages include mathematical apparatus, algorithmic languages, modeling languages.

M. Ten identifies the following components of pedagogical modeling [11]:

- formulation of the purpose of pedagogical activity;
- planning, designing of the educational process;
- development of methods, ways, devices and organizational forms of training;
- development of parameters and criteria for educational activities evaluating.

However, this can be applied only to educational activities – pedagogical modeling is not limited to it, because it involves the modeling of teaching systems, heterogeneous pedagogical structures and so on.

He rightly believes that the pedagogical model in the narrow sense is a tool with a predetermined purpose, developed methods and means in its achievement, and also includes the parameters of evaluation of actions and comprehension of the effectiveness in its composition, that is, the design and organizational chart of the pedagogical model includes three interrelated components: the purpose, means of its achievement and the results.

Studying the problem of teaching younger students to modeling, A. Karpenko developed the didactic classification of modeling and educational models by the nature of the experience gained:

- objects and their properties (model-standard, explaining model, casual model, innovation model);
- the relationships of the object being studied (illustrative model, model conformity, structural-functional model, systematizing model);
- actions on the study of objects (algorithmic model, model of the action methods presentation, model of certain actions mastering operations).

Table 1

Distribution of the content models depending on the process of their construction

№	Model	Distribution by function and goals	Characteristic
1.	Imaginary	descriptive	any description of the object
		explanatory	allows you to answer the question: why this happens
		predictive	describes the future behavior of the object
2.	Conceptual	–	determines the structure of the model system, the properties of its elements and causal relationships that are inherent in the system and are essential for achieving the goal of modeling
3.	Formal	–	representation of a conceptual model through formal languages

Moreover, the author quite rightly notes that the multidimensional modeling as a pedagogical phenomenon does not allow him to be covered by any particular systematization. We believe that in order to characterize the models of certain disciplines, it may be useful in the indicative plan [2].

Nevertheless, in our opinion, it is not possible to make a complete and exhaustive classification of the phenomenon of "pedagogical modeling". In the context of solving specific problems, as a rule, stand out certain types of models, characteristic for a certain semantic reasoning.

Summarizing the considered scientific studies, we can conclude that the main contexts of didactic modeling researchers call: a method of studying objects with their models; constructing and studying the models of actually existing and artificially created objects and phenomena; the content to be mastered, and the means of its assimilation.

Therefore, modeling as a method of cognitive activity of education subjects in the system of primary education contains the following hierarchical levels: the method of knowledge (research); teaching method; reception of cognitive activity; mental operation.

As a result of analyzing the approaches of scientists to the classifications of various models, it was not found that there is a clear classical classification, and therefore for the source of modeling objects we have chosen the definition of "pedagogical technology", or rather its interactive-synergetic model, in which the activities of subjects are carried out through the developed methodical system. It has acted as a system-forming factor (indicative basis) for finding the result [9, p. 7]. by its the form an interactive-synergetic model is spatial, and by the content is a hierarchical one, which makes it possible to streamline the concept of "pedagogical modeling".

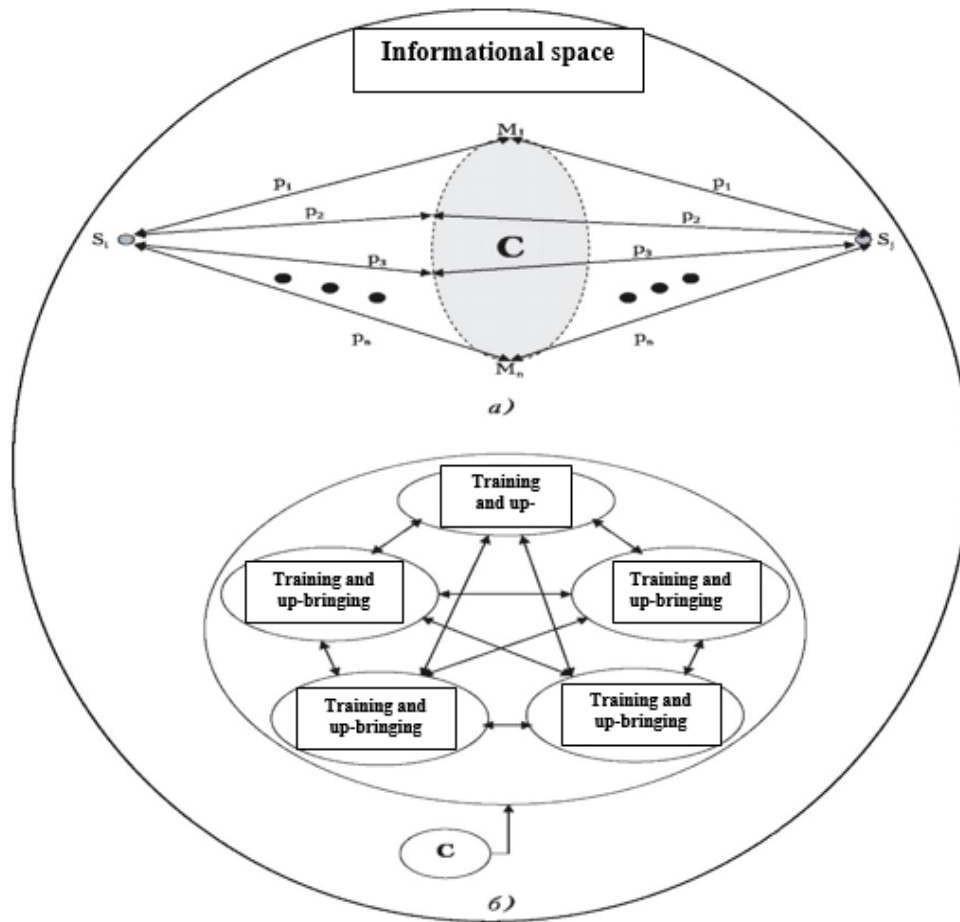
According to the aforementioned approach, "pedagogical technology" means "the set of substantiated projective actions P1 ... P2, ..., Pn, carried out by the subjects of the educational process with the aim of preparing future teachers of the primary classes and forming the competitiveness in accordance with the requirements of the information society" [9, with. 22-23], which is illustrated by the model presented in Figure 1.

First of all we consider the possibilities of the mentioned integrative-synergetic model of the pedagogical technology as a reference point for selecting objects of the pedagogical modeling. Since the model is purely pedagogical, therefore, each of its components (according to the hierarchical levels) acts as the object of pedagogical modeling (Fig. 2).

In this regard, we have identified several groups of pedagogical modeling objects:

- operational-procedural (educational process, teaching process, learning process, teaching methods, training methods, strategy for achieving a certain goal, algorithms, etc.);
- content (various educational subjects studying objects, types of tasks and assignments);
- organizational (lessons and other types of the learning process implementation);
- accompanying (training means, computer support)
- behavioral (subjects of study behavior, determined by educational influences – in the narrow sense: perception of purpose, understanding, reproduction and application, educational material).

The proposed integrative-synergetic model plays a dual function for our study. On the one hand, it serves as a direction for selecting the objects of possible modeling by a future teacher of elementary school, and on the other hand, it is a purely technological meta aim, since it forms the basis for creating models for its pedagogical modeling readiness and for the competitiveness formation.



On Fig. 1 - S_i , S_j are the subjects of training and education, in particular in higher educational institutions: P_1, P_2, \dots, P_n are the projective actions carried out by them. there are many C methodical systems that mediate and direct the activities of teaching subjects S_i . Components in the plane C (Fig. 1a) are deciphered only in block 1b, which makes it possible to interpret these interactions in different ways, even to interpenetration, integration.

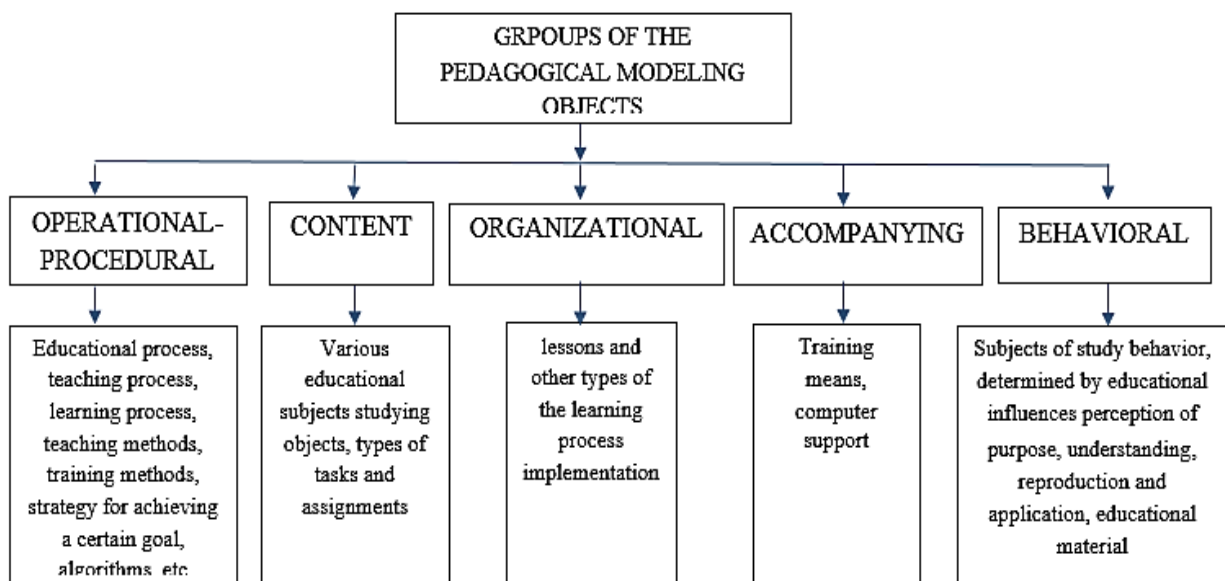


Fig. 2. The main groups of pedagogical modeling objects

Thus, the pedagogical modeling is a prerequisite for the scientific provision of the competitive specialist training practice in the field of elementary school. A competitive specialist in the field of pedagogical activity is a specialist who has the professional competence, laid in the educational-professional program branch (OPP), and the ability to solve typical problems of professional activity, the solution of which, according to our research, can be provided by pedagogical modeling.

In future researches we plan to substantiate the structural components of the developed model of the future teacher of elementary school competitiveness formation, based on the competent, personally oriented, activity, systemic, acmeological approaches and is a methodical system in the structure of which the goals and objectives of teaching, methodology, approaches, content and the means of teaching, the guiding principles, methods, forms of learning, the result, the conditions are presented.

References

1. Dakhin A.N. Pedagogical modeling: monograph. Novosibirsk, 2005. 230 p.
2. Karpenko A.V. Training of younger schoolchildren for modeling as a method of educational and informative activity: diss. ... candidate ped. sciences: 13.00.01. Bryansk, 2006. 245 p.
3. Kataeva M.L. Modeling of professional activity in the process of preparation of future teachers in pedagogical college : diss. ... candidate ped. sciences: 13.00.01. Perm, 2007. 236 p.
4. Classification characteristics and classification of models (study manual "Mathematical modeling of communication systems" Ulyanovsk, 2007) [Electronic resource]. URL: http://sernam.ru/book_mm.php (Last accessed: 10.03.2018).
5. Kozhaspirova G.M., Kojaspirov A.Yu. Pedagogics Dictionary [Electronic resource]. URL: <http://slovo.yaxy.ru/87.html> (Last accessed: 14.02.2018).
6. Kraevskii V.V. Modeling in pedagogical research. Introduction to scientific research in pedagogy: Textbook manual for students of ped. Ints. Moscow, 1988. – P. 107–122.
7. Lodatko Ye.O. Modeling of pedagogical systems and processes: monograph. Slavyansk, 2010. 148 p.
8. Lugovoi B.I. The Problem of the Concept-Categorical Device of Pedagogical Science. *Pedagogical and Psychological Science in Ukraine: Sb. scientific works to the 15th anniversary of the Academy of Pedagogical Sciences of Ukraine: 5 t.* Kyiv, 2007. T. 1: theory and history of pedagogics. 360 p.
9. Personally oriented technologies of education and training in higher educational institutions: a collective monograph. V. Andrushchenko and others. Under the general editorship of V.P. Andrushchenko, V.I. Lugovoi; Academy of Pedagogical Sciences of Ukraine, Institute of Higher Education. Kyiv, 2008. 256 p.
10. Semenova A.V. Paradigm modeling in the training of future teachers: a monograph. Odessa, 2009. 504 p.
11. Ten M. G. Pedagogical modeling in technical high schools as a perspective direction for the development of the spatial imagination of students [Electronic resource]. URL: <https://documents.tips/documents/-5750a9bd1a28abcf0cd29582.html>. Title from the screen (Last accessed: 05.01.2018).
12. Philosophical Dictionary of Social Terms. Composition and Order. V.P. Andrushchenko, M.L. Boychenko, M.L. Mikhalchenko; under the congregation Ed. V.P. Andrushchenko. Kyiv-Kharkiv, 2002. 672 p.
13. Yakubovsky M. A. Mathematical modeling of the professional activity of the teacher: monograph. Lviv, 2003. 428 p.

Бахмат Н.

ФОРМУВАННЯ КОНКУРЕНТОСПРОМОЖНОСТІ МАЙБУТНЬОГО ВЧИТЕЛЯ ПОЧАТКОВОЇ ШКОЛИ ЗАСОБАМИ ПЕДАГОГІЧНОГО МОДЕЛЮВАННЯ

Сучасне суспільство потребує вчителя, здатного вибудувати свою життєву та професійну траєкторію в постійно змінних варіативних умовах. З цією метою вищим педагогічним навчальним закладам слід переорієнтуватися на іншу систему цілей підготовки педагога в галузі початкової освіти. Її компонентами, на наш погляд, повинні стати готовність до виконання основних виробничих функцій та особистісно-професійні якості, наявність яких гарантує професійний успіх і позитивно виокремлює фахівця серед інших, менш компетентних. Майбутні вчителі початкової школи, усвідомлюючи важливість своїх професійних обов'язків, оволодівши різноманітними технологіями їх реалізації, будують, перетворюють і досліджують моделі різних педагогічних систем, тобто здійснюють педагогічне моделювання.

Ключові слова: конкурентоспроможність, модель, типи моделей, педагогічне моделювання, педагогічна технологія, інтегративно-синергетична модель.

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