

FRACTAL PEDAGOGY USED IN EDUCATIONAL MODELS AND TECHNOLOGIES



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ABSTRACT

The article presents the theoretical and methodological prerequisites for the formation and development of fractal pedagogy. In addition, the scientific justification of the principles of fractal pedagogy, its features and principles are considered and given. The result of the research is to determine the structure of personal and professional self-development of the teacher (motivational, design, activity-practical, reflexive, emotional volitional components). The presented research is considered as a variant of understanding the problem of personal and professional self-development of a teacher from a new perspective. Fractal methodology applicable to the problem of self-development of the teacher can be the Foundation for various psychological and pedagogical research in their perspective.

Keywords: *algorithms, methods, educational models, technologies, fractal pedagogy*

АННОТАЦИЯ

В статье представлены теоретико-методологические предпосылки формирования и развития фрактальной педагогики. Кроме того, рассмотрено и дано научное обоснование принципов фрактальной педагогики, ее особенностей и принципов. Результатом исследования является определение структуры личностно-профессионального саморазвития педагога (мотивационный, проектный, деятельностно-практический, рефлексивный, эмоционально-волевой компоненты). Представленное исследование рассматривается как вариант осмысления проблемы личностного и профессионального саморазвития учителя с новой точки зрения. Применение

фрактальной методологии к проблеме саморазвития педагога может стать основой для различных психолого-педагогических исследований в их ракурсе.

Ключевые слова: алгоритмы, методы, образовательные модели, технологии, фрактальная педагогика

INTRODUCTION

Self-development in a rapidly changing socio-cultural environment is one of the main compensations, since an actively developing specialist is able to meet the modern problems and new requirements of the professional environment. Philosophical understanding of the problems of our time allows us to formulate this article: all that is known about the future is not known how it will be. In this regard, it is necessary to train a specialist to act in conditions of uncertainty. The effectiveness of solving non-standard tasks under constantly changing conditions is directly related to the process and results of personal and professional self-development.

Digitization of society and the emerging global information network fundamentally change the processes of personal development and self-develop define their characteristics and dominant vectors. Self-development of the teacher takes place in the macro - system of integrated education environment-the macro-system of interaction microeconomics, opportunities and interpretations. The process of personal and professional self-development of the teacher in the conditions of the educational system is fractal in nature.

MATERIALS AND METHODS

The goal. Identification of the methodological bases of fractal Organization of the process of personal and professional self-development of the teacher in improving the modern educational process, development of fractals classification, self-development process.

In modern environmental conditions, there is an opportunity to consider the teacher's self-development problem in a new way, to determine the prospects of the teacher in modeling and designing the process of personal and professional self-development[Madjuga A.G.,2015, 15].

A brief analysis of the scientific works of other scientists on the topic. The self-development of the teacher should be based, first of all, on the content of motivating changes and the implementation of this process. The notorious psychologist V. Frankl considered the desire of a person to seek and realize the meaning of his life as a characteristic motivational feature for all people. V. Frankl argued that it is impossible to give meaning, it is necessary to find it. Having understood the meaning,

a person realizes himself: “the self-realization of a person occurs on his own—not as a goal, but as a result of the realization of the meaning” .

Fractal (Latin fractus - crushed, broken, broken) is a geometrical form, in which a certain part is repeated repeatedly with changes in size. Researchers of this new field believe that the father of the theory of fractals is French-American mathematician professor Benue Mandelbrot (born in France). In the last decade of the 1960s, Mandelbrot called his scientific work “fractal geometry” or “nature geometry” (about which he writes in his work “fractal geometry of nature” - “The fractal geometry of nature”). The purpose of fractal geometry is the analysis of broken, twisted and irregular shapes. B.Mandelbrot used the word fractal for these forms, consisting of fragments and parts.

B.Mandelbrot other scientists Clifford A.Pikkover (Clifford A.Pickover), James Gleick (James Gleick) or G.O.Peytgen (H.O.Peitgen) kengaytirishga moves the field of fractal geometry, that is, from predicting the prices of securities in the market to the practical application of them all over the world, to the fulfillment of new discoveries of Theoretical Physics.

Fractals are often used in science. The main reason for this is that it very accurately describes the existence in relation to traditional physics or mathematics.

The scientific essence of the article. Fractal in general terms is a structure in which the main properties are self-similarity and repeatability, that is, fractals are collections that have self-similarity. Self-similarity is expressed by the presence in the general form of a replicated element—a fractal (self-similar structure). In other words, the Fractal can be defined as an infinitely similar geometrical form, each of which is repeated with a reduction in the fraction. Thus, the tree horn is similar to the tree itself, so the tree has a fractal structure. Fractals are one of the subjects of the study of synergetics, it examines complex self-organizing systems, and the researcher needs to be structured in order to initially perceive the object under study as a fractal structure corals, starfish, shells, flowers, bronchi, blood vessels, nervous system and many other living nature objects have a clear fractal structure. A vivid example of this is the program of hereditary development, which is absorbed into the genes and is included in the composition of all cells, each of which can multiply the whole organism, similar to the original one. Chemical elements that change their properties depending on the charge of molecules and atoms, their atomic nuclei, crystal lattice and chemical bonds are fractal in their essence. Clouds, seashores, lightning, snowflakes, frosty patterns and other inanimate phenomena are also fractals.

2. Methodology

Fractal multiplies itself in these objects at each subsequent level on a smaller scale. Many natural objects are distinguished from ideal mathematical fractals by the fact that the structure is not repeated and inaccurate; in this sense, natural structures are quasi-fractals. To the greatest extent, fractal ideas are used precisely and in natural sciences. But the feature of similarity is possessed not only by fractal mathematical collections and natural objects, but also by socio-cultural phenomena. It is known that currently, fractals are widely used in computer graphics, physics, and various other natural sciences, as well as in the design of antennas in radio engineering, in the processing of signals in telecommunications, as special effects and visualization elements in film and television, in the light industry, in the drawing of patterns for modern designs on fabrics and carpets, etc. In other words, fractals exist everywhere [Madjuga A.G., 2015, 19].

DISCUSSION AND RESULTS

The principle of fractality is attributed to many social processes, in this sense it is possible to characterize any side of life on the basis of fractal nature. Examples of the Fractal Organization of socio-cultural systems: words, texts, music, patterns, Russian houses and the architecture of the eastern pagodas, cities and neighborhoods in them. The multifaceted nature of the objects, phenomena and systems in the list emphasizes that the fractal contains everything. To characterize the disproportionate fractal of socio-cultural systems and objects, we use the term “conceptual fractal”. The conceptual fractal is expressed in the form of socio-cultural practice in the conditions of a particular culture. The similarity of the conceptual fractal itself is revealed at the level of concepts, ideas, conceptions, mental constructions, configurations, as well as relations between them. Conceptual fractal self-multiplying at all levels and scales of a certain degree of structure. In such a structure, the conceptual fractal is the creator algorithm of the organization. On a Global scale, one can argue that the whole socio-cultural world is a congestive fractal.

The idea of fractals in technical sciences is not a novelty. Hence, in different science based on fractal methodology, different levels on it is based on the similarity of social systems, the cyclical nature of trends and the legitimacy of events are considered, socio-political and other fractal models are created.

The methods used in the study. The study of the akmeological process of personal and professional self-development of the teacher in the modern educational process is based on fractal methodology. In science, this methodology is used in the

study of objects characterized by instability and randomness of connections between structures and components. The philosophical and methodological basis of the study is the fractal and chaos ideas in the dynamical systems, while fractal and randomness are regarded as a single integral process.

When we talk about the Fractal methodology of the process of personal and professional self-development in the improvement of the modern educational process, we understand the set of ideas and worldview positions that underlie the personal and professional scientific and pedagogical development of the teacher based on the consideration of this process from the point of view of the theory of fractals. The leading approach to the study of fractal Organization of the process of personal and professional self-development of the teacher in the modern educational process is an integrated-ecological methodological approach. This approach allows to better understand the essence of fractal Organization of self-development of the teacher in modern environmental conditions [Madjuga A.G.,2015, 23].

Building the scientific concept of "fractal pedagogy", we were based on the philosophical positions about man as a bio-psycho-socio-cultural existential phenomenon (Aristotle, E. Huserl, G. V. Leibniz, A. E. Kazachinsky, M. Mamardashvili, F. Nietzsche, V. I. Slobodchikov, V. N. Sagatovsky, V. Frankl, M. Heidegger, etc.), the investment theory of creativity (R. Stenberg, T. Lubart, etc.), theories of self-organization (V. I. Arshinov, V. G. Budanov, M. G. Gapontseva, E. N. Knyazeva, S. P. Kurdyumov, V. S. Stepin, N. M. Talanchuk, V. A. Fedorov, I. R. Prigozhin, G. Haken, etc.), theories of fractals (V. E. Voitsekhovich, B. Mandelbrot, V. V. Tarasenko, S. D. Khaytun, etc.), noospheric (G. M. Komarnitsky, N. V. Maslova), health-creating (V. V. Kolbanov, A. G. Majuga, N. N. Malyarchuk, I. A. Sinitsina, G. Spencer, L. G. Tatarnikova, S. Frenet) and holistic types of education (Sh. A.Amonashvili, A.V. Voznyuk, L. S. Vygotsky, A. Maslow, J. Miller, M. Montessori, K. Robinson, I. Pestalozzi, Plato, K. Rogers, J. J. Rousseau, A. I. Subetto, F. Froebel, R. Steiner, etc.).

The essence of the integrated environmental approach lies in the holistic combination of different components that were previously separated. The integration-ecological approach is based on the understanding of the unification of the educational environment as a unit of their diversity, thereby creating a new object with the emerging qualities and potential opportunities of the elements, their relations and relationships. In the research presented in the article, pedagogy is also used in the connection of Science with social (psychology, philosophy, etc.) and technical

sciences (computer graphics, engineering graphics, etc.). The methodological basis of such a connection between technical and Social Sciences, in particular pedagogy, is an integrated environmental approach. The establishment of such a sciencelararo relationship is qualitatively different, at a high level it allows the teacher to substantiate the use of fractal methodology in the study of personal and professional self-development. In obtaining the results of the study, scientific methods such as analysis, synthesis, abstraction, generalization, classification and others were used.

Results and practical examples. At the formal - semantic level, fractal self-development (self-development, self-management, self-efficacyadorlik, self-introduction, self-organization, self-regulation and other components of the self-management system) can be identified. The concept of " self - " introduces the following concepts into complex concepts: the direction of the action in relation to itself; the involuntary, independent execution of the action. For example, a modern teacher has the quality of self-management and is the initiator of a continuous independent educational movement .

It should also be noted that the existing concept of “self” is interpreted as an expression of the psychological integrity of individuals, and by combining the conscious and unconscious parts of the psyche, selfishness distinguishes the individual from the surrounding world. It should be said that the importance of the concepts of” self-management " is defined as the ability of higher education to establish and implement the priorities of its activities, in particular, self-organization and self-development, as well as methods of improving it on the basis of self-esteem, in the state educational standards.

Thus, it can be understood that the group of concepts “self-” is the only system that combines the psychological concepts of a homogeneous structure with two common features:

- the meanings they describe have a psychological character;
- the subject and object of the described activity belong to the same system.

At the same time, these concepts are multifaceted, not similar to each other, and the selected fractal “self-” only formally expresses their essence.

The personal and professional self-development of the teacher includes motivational, designing, practical-activity, reflexive and emotional-willed procedural components. Corrective actions of personal and professional self-development determine the implementation of this process on the principle of concentricity, as a

result of which in the circle there is a transition to new levels of development, that is, self-development has a permanent feature (Figure 1).



1-picture. Structure of personal and professional self-development of the teacher (compiled by the author)

The result of the research presented in the article is to determine the Fractal essence of the teacher's personal and professional self-development process, to determine in the context of integrated education and to develop the classification of fractals on this basis and the environment in which this process is carried out.

The developed classification of fractals is based on the following.

- * structural and procedural parts of personal and professional self-development of the teacher;
- * the structure of the integrated educational environment in which the teacher's self-development process is carried out;
- * opportunities and resources of professional development integrated learning environment.

CONCLUSIONS

As a result of this study, the main conceptual fractals of the teacher's personal and professional self-development process, structural fractals of the integrated learning environment, as well as the phenomenon fractals of the teacher's self-development in this environment were identified. The fact is that the selected fractals are congruent fractals, their mutual similarity at the level of concepts and ideas, and also reveals the existing relationships between them.

The main konsereptual fractal. V. Based on the ideas of Frankl, it can be argued that the personal and professional self-development of the teacher is of a figurative nature, and the meaning is the driving force of the process of self-development. The teacher himself creates a developing environment, unites his Resources personally with important meanings.

In this regard, it is appropriate to talk about akmeology of meaning - a system of views, knowledge and ideas about understanding the meaning of personal and professional self-development in conditions of a dynamic environment. Akmeology

of meaning is the main vector that determines the personal and professional self-development of the teacher

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