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Fractal-holographic thinking of students: the essence, principles, mechanisms and technologies of formation

Abstract. Authors reveal the content and essence of holonomic approach reveal the basic principles and technologies of fractal-holographic thinking of university students. The artistic and plastic language of art is considered as a means of forming fractal-holographic thinking of students that acts as a fundamental basis for solving educational problems of fractal pedagogy.

Keywords: fractal pedagogy, personality, self-movement, self-organization, fractal-holographic thinking, holonomic approach.

Introduction

In the light of modern trends observed in the context of post-non-classical education, fractal pedagogy should be considered as an important factor in the organization of the space of formation, existence and activity of the individual. The personality appears here not as an object of influence, but as a subject, a “director” of his own actions, defines for himself and constitutes in his life world “his” space, filled with ideas, values, attitudes, ideas about the world, everything that has significance for him at the moment. The fundamental principles of fractal pedagogy can also include the principle of trust in human nature, which asserts the initially positive, constructive essence of a person, laid down in the form of potential.

The consequence of this is respect for the individual, understanding of its value, recognition of the uniqueness and uniqueness of each individual, its right to free development and manifestation of its abilities, which together leads to the most successful socialization and adaptation at all levels of life. Because the essence of being lies in the self-movement, self-organization, through the prism of fractal perception holonomically the integrity of the universe, society and individual human being is seen according to the holographic nature of man as “nested” in the Genesis system, the essence of universal existence. The holonomic approach is a broader, holistic and multifaceted view of understanding the essence of human nature and the entire universe, which is based, as we said above, on a holographic model of the universe and human consciousness [26]. In this regard, the problem of the formation of fractal-holographic thinking of university students in the context of post-non-classical education, which is the basis for the formation and development of the third millennium human being, is of particular relevance.

Materials and methods of research

In the refinement of the definition of “fractal-holographic thinking”, considering its essential characteristics in the aspect postclassical education was a synthesis of philosophical, psychological, culturological and pedagogical literature on the problem of the study, which was carried out the analysis of ideas about multidimensional human thinking, has established principles and identified the mechanisms underlying the formation of the fractal-holographic thinking of students in the context of post-non-classical education.

The choice of research methods is determined by its goals, tasks of a particular stage, conceptual approaches implemented in the study, which provided the necessary depth of study of the main aspects of the problem. The purpose of the study was to consider the essence of the concept of “fractal-holographic human” and conceptual approaches to understanding and content of fractal-holographic thinking as a complex interdisciplinary phenomenon, to determine the mechanisms, techniques and methods of its formation among university students. Within the framework of the study, a number of tasks were supposed to be solved.

On the basis of theoretical analysis of literature on the research problem to clarify the definition of “fractal-holographic thinking” in the

context of the theoretical positions holonomes and fractal resonance approach, to show the relationship of the fractal-holographic thinking with the formation of ideas about the new model of the universe, a holographic model of the Universe and human consciousness. In the course of identifying the conceptual and theoretical foundations for the formation of fractal-holographic thinking of university students in the realities of post-industrial society, focus on post-non-classical education and criteria and indicators that characterize the level of formation of fractal-holographic thinking of university students.

Results of the study

Building the scientific concept of “fractal-holographic thinking of man”, we were based on philosophical propositions about man as a bio-psycho-socio-cultural-existential phenomenon (Aristotle, E. Husserl, 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. V. 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, D. Zaupe, B. Mandelbrot, H.-O. Paytgen, V. V. Tarasenko, S. D. Haitun, H. Jurgen, etc.), the idea of noospheric (G. M. Komarnitsky, N. V. Maslova), health-creating (V. V. Kolbanov, A. G. Madzhuga, N. N. Malyarchuk, I. A. Sinitsina, G. Spencer, L. G. Tatarnikova, S. Frenet) and holistic education (Sh. A. Amonashvili, A.V. Voznyuk, L. S. Vygotzky, A. Maslow, J. Miller, M. Montessori, K. Robinson, I. Pestalozzi, Plato, K. Rogers, J. J. Rousseau, A. I. Subetto, F. Froebel, R. Steiner, etc.) [2; 6; 10; 13; 25; 28; 30; 32; 33; 34 35; 36; 37].

The study of the principles and mechanisms underlying the formation of fractal-holographic thinking of university students is associated with the construction of certain educational models that set the goals and scheme of post-non-classical education, which determine teaching and learning activities, control and reporting, and ways to evaluate the learning process [17]. As an educational model used in the framework of the formation of fractal-holographic thinking of students, the facilitation-resonance model is used, which contributes to the formation of nonlinear, fractal-holographic thinking of students and their formation as active constructors of their own life activity

The educational process based on this model is characterized by man-centered focus and provides the transition from diagnosis ways of

personal choice to the diagnosis of its development, from adaptive-disciplinary models of knowledge acquisition and skills – to the birth of the world image in the joint activities of all participants of the educational process, from information cognitive pedagogy is to the semantic value of pedagogy, technology of education under the formula of “the unanswered question” – in life tasks and cognitive motivation of the listener, from the “trained helplessness” – to notsituation activity and putting the most important task, from training as an authoritarian monologue to the collaboration and assistance from the language of the administrative orders, to the language of “arrangements” and “recommendations” from the culture of usefulness – to the culture of dignity, salientia to man – centeredness.

The post-non-classical paradigm assumes setting a qualitatively new goal in the system of professional pedagogical education – to prepare a highly qualified teacher-creator, a person interested in self-change, who has a need for self-development and is able to create socially significant products of his own professional activity. Hence, the content of the preparation process changes. So a professional teacher does not broadcast innovative educational technologies, does not just introduce the student to the ideals of classical pedagogical science, he organizes an extremely important act of revealing the other significance of pedagogy in the mind of the subject. The future professional teacher chooses special elements of pedagogical science that are significant only for him, which are able to fit in and correspond to the value-semantic coordinates of his life world, become personally significant for him and find their place in it. The post-non-classical understanding of the world and man in the world is characterized by the growing reflection of scientists on the values and semantic contexts of human existence.

Post-non-classical science is characterized by the emergence of a type of scientific rationality that: combines the sciences of nature and the sciences of the spirit. In the modern scientific picture of the world, the former types of rationality do not deny each other, but distribute spheres of influence among themselves; depending on the research tasks, the same reality can be considered from different positions and can be the subject of development through different types of rationality; in these conditions, the cultural and value-semantic contexts with which the subject relates the known and understood reality become crucial.

Modern scientific research can be carried out with the help of post-non-classical methodological approaches [1; 5; 7; 14; 21; 24]. As

you know, post-non-classical science turns to the study of self-developing, open, non-equilibrium systems. The concept of self-organization of the system absorbs a “family” of other concepts: causality, goal-setting, self-functioning, conditionality, etc. It absorbs in the sense that the new categorical apparatus reflects one-order system phenomena. None of them has a decisive ontological status that constantly determines the life of the system. Self-organization of the system occurs as a result of a radical restructuring of the hierarchical structure, and the method of restructuring is carried out each time according to an irreversible scenario. The description and explanation of this scenario each time correspond to the nature of the given moment and cannot be a complete impression of the studied reality.

In post-non-classical science, the system approach accumulates all other ways of studying reality, which, while losing their epistemological autonomy, do not lose their specificity. System analysis can be summative, complex, structural, functional, historical, logical, comparative, activity-based, depending on the set research goals. Scientific search reflects a certain moment of self-organization of a strong non-equilibrium system or a stage of evolution of global systems. Differences in the methodology of natural-scientific and humanitarian knowledge become minimal, and the previous installation on the hierarchy of general scientific and private scientific methods does not bring the desired result. In post-non-classical science, the system object is studied as an object of interdisciplinary knowledge, thereby allowing to reveal the truly scientific potential of modern pedagogical and psychological knowledge. Note that with each new stage of the evolutionary development of scientific knowledge, the existing assumed model of reality leaves an imprint on the nature of its description, which remains relevant only for a specific interval of explanation, and one of the striking examples of a common error in determining the methodological basis of a wide range of studies (in particular dissertation) is the leveling of these interpretation intervals.

In post-non-classical pedagogy, the oppositions “subject-object of study” and “subject-object of interaction” are no longer relevant. The studied reality is essentially not closed and is open to spontaneous environmental influences, thus allowing the use of variability in determining the logical status of education.

The post-non-classical scientific paradigm, viewed through the prism of modern cognition, is based on significant advantages, since as a glob-

al trend of science, it places the subjectivity and “human dimension” of scientific knowledge at the forefront, which is manifested in a close connection with such systemic components as: a complex of anthropological factors, the development of the social environment, interactive inter-subject communications, etc.

In the context of post-non-classical ideas about the world, thinking at the level of the holonomic mode of consciousness plays a decisive role. (Wilber, S. Grof et al.). An example of thinking formed within the holonomic mode of human consciousness is fractal-holographic thinking, which acts as a result in post-non-classical education. To explain the essence of fractal-holographic thinking, let us turn to the interpretations of thinking available in the scientific literature. So, thinking is regarded as the highest level of human cognition, the process of reflection in the brain surrounding real world, based on two fundamentally different physiological mechanisms: education and continuous replenishment concepts, ideas and new judgment and reasoning [27].

Thinking allows you to gain knowledge about such objects, properties and relationships of the surrounding world that cannot be directly perceived with the help of the first signal system. Thus, thinking is defined as the mental process of interpreting what is perceived.

From the above definitions, it follows that thinking is a mental process, and not a natural given, therefore, this skill can be learned. And since thinking is a process of cognition, it includes not only established knowledge, but also the general ability of the individual to constantly replenish the sphere of thinking with new knowledge and the ability to see in volume.

From the perspective of the problem under consideration, the typology of thinking based on the ways and levels of thinking is of particular interest [29]. Within this typology, it is customary to distinguish between point thinking, linear thinking, planar “thinking,” multi-level “thinking, three-dimensional or” three-dimensional “thinking,” holographic “thinking, and multidimensional thinking. Here, we consider it appropriate to give a brief description of each of the presented types of thinking:

- point-based thinking-action-oriented here and now, thinking focused on” one-second “ tasks. When a person in the process of solving mental problems does not take into account the consequences of their actions, especially the remote ones. In addition, it does not take into account parallel processes and their consequences (“I want-I take”, “I interfere-I delete”, etc.);

- linear thinking is close to the “stimulus-response” type, but it is possible to build chains, predict, it is described by the rules of formal logic. Linear thinking has its ontological basis in the objects of the manifested world. The conditional scheme of linear thinking consists in choosing a certain statement, one trend in the development of events, one belief or opinion, etc.; in unfolding the evidence in only one direction and then evaluating it. It is also possible to build chains and create events on the “domino” principle, when one event causes subsequent ones, and so on. At this level, patterns begin to form. Thus, linear thinking involves only one condition – the mental process, and most often it is the process of finding confirmation of one’s thoughts, beliefs, points of view, and ideas. The product of linear thinking in relation to a particular subject is a set of individual aspects identified through analytical procedures, the establishment of spatial, temporal, causal and hierarchical relationships between them and the subsequent reconstruction of the subject with the inevitable loss of other aspects-undetected, hidden, potential or contrary to the reconstruction procedure. The main disadvantages of such thinking will be a constant defensive position; condemnation, accusation and, as a reverse side, a sense of guilt; inability to see opportunities, lack of dynamics, the presence of “cliches” or stable stereotypes that lead a person to ineffective solutions in previously experienced problem situations.

- “flat” thinking – when” lines “ are tracked simultaneously, there are many of them, they can intertwine with each other. In the process of solving problems, they are taken into account, predicted and lined up, while it is possible to “weave” a pattern of event lines, taking into account the influence of “lines” (parallel processes) on each other. Here the “points of crystallization” of events and processes around work and here the system approach already begins. In this case, the patterns acquire the complexity of the drawing and their recognition, at this level of thinking increases.

- “multilevel” thinking, when the presence of different logical and organizational levels is taken into account, there is a “convergence of trajectories in a tangle”. At this level, thinking is a systemic process, with the controlling and system-forming factor playing a decisive role. The construction of a hierarchical multi-level system of representation of objects, situations, actions and processes occurs simultaneously, both along the line of formation of aggregations (part-whole) and along the line of formation of generalizations (particular-general).

- hree-dimensional “volumetric” thinking, which takes into account the existence of different “layers” in reality, the existence of different “planes”, meaning “field” (including paradigms), etc prevalent “systemic factor”, the principles of synergy and self-organizing systems, the principles of fractality, and the laws of chaos. The product of three-dimensional thinking is the object as such, the object as totality with the inclusion of all possible aspects, including contradictory, and aspects of the background, and aspects of a fundamentally invisible environment. Conditional scheme of three-dimensional thinking: acceptance of different points of view as acceptable: understanding that everything has its own polarity and vision of any problem, any event from both one and the opposite side; lack of division into positive and negative and acceptance as neutral, in fact.

In our opinion, three-dimensional or” three-dimensional “ thinking can be correlated with synergistic thinking. Synergetic thinking is non-dual, and is based on the interconnection, unity of all processes within yourself and in the world around you. A person with synergetic thinking perceives a separate fact or event in the continuity of a general process [16; 20]. Personal activity in the formation of one’s self-consciousness and voluminous perception of reality consists, first of all, in overcoming the duality of thinking (“either this or that”, as an expression of unambiguity, linear determinism); an awareness of community with the whole world is formed, the continuity of transitions in the ascent to wholeness (“both of them – in certain conditions”). Of course, the most important cognitive principle of synergetic thinking is the idea of the creative, constructive role of chaos in the evolution of complex systems. “This is both a way to reach relatively stable structures of evolution, and a mechanism for switching vital cycles of complex systems functioning, which connects parts into a single and steadily evolving whole, and a mechanism for adaptation to changing environmental conditions, including a way to update a complex organization in nature, society and the human mind” [16, p.103].

- “holographic” thinking (holo means “whole”, graph - “write”). As Henri Bergson points out in his work “Creative Evolution”, intelligence was created by evolution in the process of its movement; it is isolated from something more extensive, or rather, it is only a projection of reality, a projection necessarily flat, while reality has relief and depth. Therefore, holographic thinking is what gives relief and depth to the perceived information [4; 9; 19]. In this mindset, all events are intercon-

nected – one event contains information about everyone, and all events contain information about everyone. Holographic thinking differs from “three-dimensional” thinking by its holistic nature, mutual influence and interpenetration. This type of thinking is accessible to a few, and is characteristic of “energets”, representatives of Eastern philosophical schools, people with extensive life experience, highly qualified specialists in various fields, writers, artists, directors, etc.

- multidimensional thinking, in which the presence and operation of different paradigms is possible. This is still the most accessible peak in this hierarchy of levels of thinking. Within the framework of this thinking, the depth of a person is determined by its “content”, its “content”, specific beliefs and values. In a broad sense, multidimensional thinking can be considered as a set of different ways of thinking, the dimension of which is greater than three. Numerically determining the dimensionality of thinking, it is necessary to take into account that an additional number of degrees of freedom (at least one) should be reserved for the work of consciousness, stimulating mental activity. In a narrow sense, multidimensional thinking should be understood as a specific way of thinking that corresponds to a higher ontological level, having a greater dimension. The main goal of multidimensional thinking is to penetrate to the essence of what is thought through the union of many meanings, both previously explicated and newly discovered in the course of multidimensional thinking acts. The emergence of new meanings of the conceivable is the result of the study of spontaneously formed correlations acquired by a multidimensional thinking subject as a result of intentional tension about the subject of thinking; multidimensional thinking is carried out by operating with concepts, while the concept is understood as an open set of meanings. Multidimensional thinking opens the way to the formation of new cognitive strategies that contribute to the elimination of cultural gaps resulting from cultural differentiation.

Discussion of the results

Semantic analysis of the terms “fractal” and “hologram” allowed us to define another type of thinking-fractal-holographic. Fractal-holographic thinking is a process of holistic reflection of the surrounding reality, during which there is no gradation into sensory, logical, bodily, intellectual and spiritual components in perception. As stated by R. Arnheim, truly productive thinking must take place in the perceptual domain. Therefore, the basic mechanism of fractal-holographic thinking can be

defined as the ability of a person to respond to a "perceptual challenge", which initiates quite complex and deep thoughts and feelings, which involves the use of a huge integrative potential of art.

From the perspective of the presented interpretation of fractal-holographic thinking, techniques and techniques that ensure its formation in students are of particular interest. They can be related: the technique of "Fractal image" (T. Z. Poluektova), the technique of "Thinking pattern" (V. A. Melnikov). In accordance with the theory of the organization of the world as a fractal structure, where any information is naturally repeated at various scale levels, in the technique of fractal drawing, the macrocosm is a person, and the microcosm is his drawing.

The technique of "Fractal drawing" was proposed at the end of the XX century [18]. The purpose of this technique is the actualization of the resource potential of the individual and the search for ways of self-realization. Here, the principle of similarity (fractality) is applied initially, when a person draws his first drawing and, without realizing it, transmits his inner state. The drawing made in this way is directly related to the psychoemotional and physical state of a person, in addition, in this drawing you can find information about his childhood and youth, environment and relationships in the family.

Through this technique, there is an awareness of the energy-informational nature of a person. This technique allows you to identify his type of consciousness-rational or intuitive. The rational type belongs to the realm of intelligence, and its domain is our daily activities and the reality associated with them. The intuitive type is a completely sensory-intuitive perception of reality, it is all that is connected with the past, present and future intuitive and emotional experiences of a person that exist at the level of the subcortical structures of the brain. Depending on the set of determining factors in each person, either one or another type of consciousness prevails, but it is the ability to penetrate or at least hear the voice of one's intuitive that determines the quality of life and the level of self-realization of a person.

Within the framework of this technique, using the analysis of a person's color perception, it is possible to accurately determine his emotional and physical state. Through the perception and the connection between the fine motor skills of the person and his emotional and physical and mental conditions, through a consideration of rational and intuitive perception of man and his creative activity, is possible with high accuracy to carry out the diagnostic process the main features of the

nature and qualities of human personality. Targeted personal attitudes of consciousness and information from the deep levels of the subconscious allow us to achieve a multi-level disclosure of the psychoemotional state of the diagnosed person, identify hidden psychophysiological complexes and come to a common understanding of the human condition. The technological techniques used in the methodology, key features and criteria in the process of analyzing drawings allow everyone to independently diagnose and correct their condition, using the universal concepts of harmony and beauty. Thus, on the one hand, the technique of “Fractal drawing” can be used to diagnose the multidimensional manifestation of the mental and physical in a person, and on the other-to act as a means of revealing internal potentials, expanding the boundaries of ideas, cognition and thinking, emotional rapprochement with oneself (internal balance).

Along with the presented technique “Fractal drawing”, which is more diagnostic and corrective in nature, it is necessary to refer to the methods of domestic scientists (V. A. Melnikov, E. E. Purik, etc.), which are aimed at forming the creative thinking of students through the use of artistic and plastic language of art [22]. Thus, the defining role in the method of “Thinking with a drawing” (V. A. Melnikov) is occupied by the problem of great imagery, the role of tonal relations in classical and modern art, the energy of tone, expressiveness, space, composition, universal laws of art, which together represent the artistic and plastic language of art.

As you know, creative thinking involves a mental (as opposed to craft) component of the drawing process and includes a number of aspects:

1. the ability to think compositionally, professionally master the tonal-plastic range, clearly identify the design of the form, subtly feel the proportions of the model, as well as making your own view of the world to create a bright artistic expressiveness of the image object through the actualization of the chain: representation-image-action-object;

2. the ability to convey the spatial and emotional-psychological characteristics of the subject;

3. understanding the relationship between the visual features of the subject and the ways it is depicted;

4. knowledge of the methods of applying the means and techniques of graphics to the tasks of creating an artistic image in painting and graphics; architectural and design design;

5. understanding the interdependence of the author’s design and the nature of the graphic image.

According to the method of “Thinking by drawing”, teaching drawing is based on a consistent study of artistic means in accordance with the tasks of a particular type of artistic activity (ideally, different types of creativity, since variability gives a better understanding of the problems of art).

Teaching drawing to students of various fields – painters, graphic artists, architects, designers – begins with the image of a real form from nature, the development of the principles of its constructive construction, the development of technical and artistic techniques of image, the concepts of “line”, “tone”, “chiaroscuro”, “color”

Drawing from nature (performing both long-term works and sketches, short-term sketches, sketches) is the initial stage of training, mastering it leads to the development of methods of working on memory and representation, the gradual formation of the ability to create images of objects and phenomena. At the same time, it is important for students to be able to solve compositional problems in drawing – from placing an image on paper to compositional constructions based on imagination, using various visual materials and techniques (pencil, pen, charcoal, sanguine, etc.).

The degree of awareness of the basic concepts of visual literacy in art education depends on the correct hierarchy of its interrelated positions (form, tone, volume, illumination), on the completeness of understanding of their content. One of the main problems in teaching drawing is the problem of developing a sense of tone in students, because the basis of both graphics and painting, i.e. the craft side of the leading art forms, is drawing – the art of recreating on the plane of three-dimensional space, objects of the real world by graphic (linear and tonal) means.

Drawing training is based on the development of artistic-figurative, spatial, compositional thinking of students, which is an important component of fractal-holographic thinking. Here, the shape is formed on the plane of the sheet due to the line (which has such characteristics as quality and quantity), the tone (its energy), the tonal achromatic organization of the plane (or the tonal-rhythmic basis of the composition). Line, stroke, spot create the energy of tone, emotional tension, the illusion of space, organizing the composition of the graphic sheet, creating a holographic model of the image of real reality.

In turn, the tonal achromatic series organizes the spatial environment not only of the graphic, but also of the pictorial work. It is no coincidence that the best of the paintings make a strong impression in black and white reproductions.

Tone is an essential quality of plastic drawing, allowing you to find an unexpected solution, unique in its kind, placing objects in space. The “energy of tone” creates an internal movement of form-forming elements, “loads” the volumes with figurative and rhythmic components, enhancing the expressive qualities of the work.

The integral achromatic tonal organization forms the hidden meaning of the form of the pictorial work. If we build a form by means of a linear-constructive drawing, we give clear information about what is depicted in the spatial environment (by means of composition – such as rhythm – proportion – scale) formed on the surface of the sheet. This is the foundation, a kind of matrix that allows you to methodically competently develop an understanding of the form in the process of learning to draw.

When solving these problems, it is necessary to be guided by a set of principles that reflect the regularities of the formation of fractal-holographic thinking of university students [18; 19]:

1. The principle of non-linearity allows for a multiplicity of development paths caused by the unpredictability of the result: the content of education, as a rule, does not correspond to the system of competencies of students and, both the process and the result, are rarely identical to the teacher’s plan. The non-linearity of the system leaves the possibility of improvisation, moving away from rigid frameworks and regulated conditions, and promotes the development of creative approach and lateral thinking.

2. The principle of congruence states that the more congruent the sender of the message (teacher), the greater the probability of fulfillment (understanding) on the part of the recipient (student). If the teacher himself believes in the importance and necessity of studying this material, it will be easier for him to convince students of this. If the teacher is really passionate about their subject, they are more likely to inspire students to learn it.

3. The principle of openness, within the framework of which any pedagogical system should actively interact with representatives (teachers and students) of other levels of education, as well as with representatives of various professions for detailed and visual acquaintance with them.

4. The principle of fractal harmony asserts the idea of the need for holistic human development-emotional, aesthetic, intellectual, physical-as a system where each element is interconnected and interdepend-

ent with each other. The greatest result in the learning process can be achieved if in the study of any section of subject knowledge, as many such generic and derived fractals as possible will be involved. For example, training using the “effect of immersion in the era” when, in different disciplines in parallel, studied history, literature, culture, and even sports activities a specific historical period; the performance of tasks with elements use of knowledge of various disciplines, independent research, theatre games and science experiments. In the context of this approach, it is promising to use elements of actualization of joint activities between students, thereby expanding the possibilities of the individual sphere of knowledge through the convergence of individual and group consciousness.

5. The principle of hierarchical knowledge. At the moment, the existing system of assessing students ‘ knowledge looks more like: “5” - “presented knowledge in accordance with the program”, “4” - “did not reach the highest grade, but, in general, satisfactorily coped with the task”, “3” - “demonstrated initial knowledge” (very often the grade “satisfactorily is set solely out of compassion), “2” - “showed complete incompetence”. It is important to change the existing attitude to the point system in the assessment of knowledge, making it “five-point” in the full sense of the word, then we will see a different picture. The manifestation of complete incompetence in relation to the subject is supposed to be evaluated as “zero”, “one “ and “two “ - this is also the level of knowledge of the material, albeit unsatisfactory. Mastery of subject minimum mandatory for each student, must comply with the “satisfactory” rating; a deeper level of knowledge of the material presented by the teacher (available in the mandatory training literature) is subject to the assessment “good”; focus on independent search of knowledge and creative approach to completing tasks, deserves “excellent”. The creation of such a curriculum, which provides for the differentiation of hierarchical knowledge and a clear definition of the subject minimum, will allow students to independently choose the level of study of the material they need for further professional training. In this context, the point assessment of knowledge should reflect the level of training and depth of mastery of the subject of study, thereby acquiring an individual focus, and not be an indicator of the diligence or discipline of students.

6. The principle of otherness implies the formation of a sensitive attitude to the world around us, as opposed to focusing on the primary satisfaction of one’s own needs, the ability to see and fill the need of another, the ability to sympathize, empathize and rejoice.

7. The principle of resonant interaction is necessary for the effectiveness of the educational process, since the teacher and the student must be “on the same sound wave” [14]. At the same time, the teacher’s mandatory ability to transform complex objects of theoretical knowledge into the most understandable ones for a particular student, in terms of the level of his culture, thinking skills, and general ideas about the world around him, remains important.

8. The principle of holographic projection (A. S. Belkin) involves the process of multidimensional volumetric disclosure of the content of the studied knowledge, states that combine at least three projections with centric vectors: a) vitagennuyu-vitagennaya information of students, demanded by the teacher in the learning process to prepare for the presentation of new knowledge. Vector: student-knowledge-teacher; b) didactic – scientific information coming from the teacher using vitagenic information of students. Vector: teacher-knowledge-teaching; c) constructing-information coming from any additional source (vital experience of others, book, mass media, works of art, scientific data, meetings with specialists of various branches of science, etc.) and creating a complete holographic picture of knowledge. In the course of implementing this principle, the student becomes a full participant in the educational process, provided that education is based on his life experience, which is considered as an important source of learning. The student’s own experience reflects his life position, the content that he learns is superimposed on his experience, combined with it. In this context, the vitagenic experience appears as the result of a serious analysis of events, their assessment [3].

9. The principle of information acceleration (I. P. Getmanov), which characterizes the features of coevolutionary development of complex open systems. From the position of this principle is seen from the information model of the future inherent in the educational reality as complex self-developing system, and its structural evolution as coevolution proceeds of all structural elements and management systems through the structuring order out of chaos, fluctuation of disturbances in the interaction result information to the multi-level system elements among themselves and with the external environment. Evolutionary structuring of the system is an increase in its information capacity. The principle of information acceleration demonstrates the logic of accelerating the pace of evolution: each subsequent stage of evolution is characterized by an increased information capacity of the system. Due to the law of

information acceleration in the system interaction “teacher-student”, the intensity of information processes of resource exchange with the environment in the subsystem “ student “is much higher than in the subsystem”teacher”. Compliance with the principle of information acceleration implies the construction of an educational space taking into account its temporality: the teacher should not so much keep up with the intensively increasing information flow of information, as teach to receive this information independently, as it is relevant and in demand [8].

10. The principle of optimization of reflexive interaction – orientation to the optimal use of reflexive support and reflexive support of educational and cognitive activities of students in individual and group forms of training. This principle is based on the ability of a highly organized system to evaluate itself, thereby allowing you to find the most optimal ways to develop and expand learning patterns.

11. The principle of holism is aimed at considering a person as an integral being, a component of the system “personality-environment”, consisting of a set of mutually conditioned and mutually agreed structures. At the same time, the biomorphological structure of the human body and its psycho-emotional component should be organically inscribed in its social existence.

12. The principle of the self. The self (German selbst – “I”, self – identity) - in the analytical psychology of C. G. Jung, acts as an archetype of order, the center of the integrity of human potential, integrating all human mental processes, conscious and unconscious, and acting as the principle of their unification [31]. The” self “ of a person is expressed in the ability of a person to internalize and assimilate in a creative and universal form the socio-cultural experience that is the basis of his self-realization in society. This experience allows you to preserve the unique, original, self-sufficient features of a person, revealing his boundless possibilities and openness to various kinds of changes; to realize yourself as some immanent identity that preserves your own “I”, supporting and self-adjusting the structure of the personality in any conditions. Thus, the human self is an organized, connected whole, which includes in its context a continuous process of awareness, reflection and is constantly in development as social reality changes. This leads to an understanding of the existence of a polyphonic self, which, unlike other types of self, where the dominant monological feature of world perception is seen, is realized at the point of contact with different-order self-images. In

the psychological analysis of the personality, to reflect its psychological connections and relations with the surrounding reality, plays a decisive role polyphonic self, which is seen as a way of existence of man, combining in the process of life is complex and sometimes contradictory samotnie images, but the United man into a complete experience, ensuring their harmony and according to their own unified whole [11;12]. The selection of the polyphonic type of self fully reflects the complexity and ambiguity of the position of a person in a modern, rapidly changing society, which contributes to the emergence of this type of self, a person who is able to react very quickly to the continuously transforming realities of time and not lose himself in this unstable existence, but be able to resist the impending chaos, provide self-organization, self-adjustment and feel himself as a whole.

13. The hologram principle of being system reflection is the mutual reflection of the deep and surface (in the same way as the rational and irrational ways of cognition) levels of reality description. It is important, however, that this principle is realized only under the condition of the unity of the world, when it forms a single whole, in which each element appears absolutely valuable and necessary for the whole, since the removal of a single element from the general architectonics of the whole leads to its destruction. At the same time, in the context of this principle, it is the person who appears as the initiator of reality, the world is initiated (“created”) in the process of the act of contemplation (participation) of a person (“Observer”) of the world.

All these principles characterize the orientation of the content of education to master the necessary volume and level of training in the chosen professional field, the development of self-education skills, self-organization of activities, self-development, independent solution of practical problems using a creative approach and the creation of trusting relationships in the dyad “teacher-student”, based on mutual respect and technologies of educational and pedagogical cooperation.

The indicated provisions of the formation of fractal-holographic thinking of students contribute to the further development of the phenomenology of pedagogical education, and the quantitatively accumulated scientific and pedagogical potential in the conditions of differentiation and integration urgently requires its qualitative (theoretical) understanding. This circumstance is the most important condition for the emerging secondary integration of pedagogical knowledge and the implementation of the conceptual ideas of fractal pedagogy in the field

of education. The study of fractal pedagogy involves the construction of certain educational models that set the goals and scheme of education, which determine the teaching and learning activities.

Changing the educational paradigm from the system “man-world” to “man-world - “I” of a person “implies a holistic development of the individual (emotional, aesthetic, creative, physical), ensuring a more complete development of human capabilities in all areas of his life. Thus, changes in modern education are based on the imperatives of a comprehensive, universal, holistic, harmonious development of the individual; the transition from a one-dimensional to a multidimensional person. At the same time, the humanistic potential of art education becomes an important factor in the development of a person in the conditions of the dominance of rationality (technologism, practicality, etc.) and the displacement of his sensory-emotional and moral potential.

The factor of holism (integrity) currently finds its realization in the phenomenon of postmodern thinking aimed at achieving a holistic reflection of reality, implemented by overcoming the principle of asymmetry of categorical oppositions, which involve considering the world through the prism of asymmetric principles, when in each particular case preference is given to one of their two paired (asymmetric) positions, such as, for example, “material – ideal”, “determinism-indeterminism”, “objective-subjective” , etc.

The desire of postmodern consciousness to overcome these dichotomies is realized in its interest in the study of “uncertainties”, “dualities”, “complementarities”, etc. In this regard, the appeal to art to solve the educational problems of our time is important and timely.

Conclusion

In our opinion, it is the appeal to the artistic and plastic language of art as a means of forming fractal-holographic thinking of students that acts as a fundamental basis for solving educational problems of fractal pedagogy. Fractal-holographic thinking is a process of holistic reflection of the surrounding reality, during which there is no gradation into sensory, logical, bodily, intellectual and spiritual components in perception. The basic mechanism of fractal-holographic thinking can be defined as the ability of a person to respond to a” perceptual challenge”, which initiates quite complex and deep thoughts and feelings, which involves the use of a huge integrative potential of art. In the context of the presented interpretation of fractal-holographic thinking, techniques

and techniques that ensure its formation in students are of particular interest. They can be related: the technique of “Fractal image” (T. Z. Poluektova), the technique of “Thinking pattern” (V. A. Melnikov). In accordance with the theory of the organization of the world as a fractal structure, where any information is naturally repeated at various scale levels, in the technique of fractal drawing, the macrocosm is a person, and the microcosm is his drawin.

In the process of formation of the fractal-holographic thinking of students in the context of post-non-classical education, a decisive role is played by a set of principles: the principle of linearity, the principle of congruence, the principle of openness, the principle of fractal harmony, the principle of hierarchical knowledge, the principle of drugadministration, a principle of resonant interaction, the principle of holographic projection, the principle of information acceleration, the optimization principle of reflexive interaction, the principle of holism, the principle of the self, the holographic principle being a systematic reflection. Thus, the formation of fractal-holographic thinking in the process of implementing the concept of post-non-classical education contributes to the development of the student's personality in a multidimensional and multidimensional aspect, allowing not only to effectively adapt to the changing conditions of social, biological, digital and informational life, but also to act as a “creator” of one's own being.

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