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Analysis of Semantic Approaches and Perspective of Cultural Codes in Teaching Education in General¹

Análisis de los enfoques semánticos y perspectiva de los códigos culturales en la enseñanza de la educación en general

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RESUMEN

El artículo analiza la posibilidad de implementar enfoques semánticos en la pedagogía rusa. Presenta un análisis de los trabajos de científicos e investigadores rusos en la esfera del uso de enfoques semánticos en el curso de la enseñanza de diferentes materias en la escuela de educación general. Se ha sugerido un modelo pedagógico integral de optimización del contenido de la educación considerando los códigos de socialización, los códigos culturales de génesis de la cultura y la jerarquía de códigos de varios tipos de inteligencia desarrollados, basados en enfoques semánticos. El artículo también proporciona los resultados de la aprobación de este modelo compuesto en una serie de seminarios web de dos años transmitidos en la plataforma digital lecta.rosuchebnik.ru y YouTube.

Palabras clave: Semántica, enfoque semántico en pedagogía, códigos culturales, sistemas de signos.

ABSTRACT

The article looks at the possibility of implementation of semantic approaches in russian pedagogy. It presents an analysis of the works by russian scientists and researchers in the sphere of usage of semantic approaches in the course of teaching different subjects in general education school. An integral pedagogical model of optimization of the content of education has been suggested considering the socialization codes, cultural codes of culture genesis, and code hierarchy of various types of intelligence developed based on semantic approaches. The article also provides the results of approbation of this model composed by a two-year series of webinars broadcast on the digital platform lecta.rosuchebnik.ru and YouTube.

Keywords: Semantics, semantic approach in pedagogy, cultural codes, sign systems

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INTRODUCTION

Relevance changes in the media space. The transformation of society into a “global village” or a “global theater” (McLuhan: 2004) through the introduction of all-encompassing electronic communications, a multiple increase in the information flow, switching to digital technologies, radicalization of the modern communication means due to endless audio- and visual imagery that activates eyesight and hearing — this set of factors requires new adequate approaches to absorbing knowledge and social experience in pedagogy. At the same time, it is necessary to take into account the fact that the transition from verbal communication to video communication based on images and nonverbal information expressed in sign systems is associated with significant growth in the intensity of the information flow and multifunctionality of the channels transferring the meanings of the message to its recipient. In this context, the main requirement for new approaches is visual compactness and multifunctionality while preserving the integrity of the operating system of sensemaking.

Changes in the educational requirements based on developmental psychology. The modern information and educational space is characterized by a constantly growing role of the systems with a high degree of formalization. As a result, along with the logocentric theory of education existing at the modern stage, the process that is taking place is a further departure from the historical logic of implementation of cognitive processes, from specific figurative realia to abstraction of semantic sign systems, which recur throughout each person's life at the level of parallelism of the processes of intellectual development and establishment of operating thinking structures (Piaget: 2004). The negative results of such processes, especially at primary school, justify the usage of figurative semantic of phenomenological component, in the first place, in the sphere of language and mathematics teaching.

Changes of pedagogical tasks. Purely pedagogical tasks are based on the requirements for the formation of interdisciplinary concepts and universal training actions. The former implies such study skills as “systematizing, comparing, analyzing, generalizing, and interpreting information represented in ready information sources; identifying the main and excessive information, semantic folding of the identified facts and thoughts; presenting information in a short verbal form (plan or main ideas) and visual symbolic form (tables, graphic charts, diagrams, and concept maps — conceptual diagrams and supporting notes”. The latter implies “the skill of giving definitions to objects, creating generalizations, establishing analogies, choosing the grounds and criteria for classification independently, infer cause-and-effect relationships, create logical reasoning, and draw conclusions (inductive, deductive, by analogy)” (Federalnyi gosudarstvennyi obrazovatelnyi standart osnovnogo obshchego obrazovaniya: (2011). It can be seen that the requirements for the analytical mechanisms of working with excessive information and methods for its folding into simple visual or verbal semantic formulas have been imposed at the pedagogical level as well.

By summing up the updated requirements, we conclude that it is necessary to semanticize the structure of the educational process, which is connected with the basic existences of a person. From the very beginning of the history of humanity, cultural (semantic) comprehension of one's life activity characterizes a new type of organization of life on our planet. Understanding the meaning of life is not available to animals, while for a person, losing the meaning of life is equal to refusing to live (Kalinina: 2011).

History of the issue and problem. The word semantics was first used by Michel Bréal at the end of the 19th century to denote research into the changes of language forms from the historical perspective (historical etymology). This term started to be used along with the word semasiology that had already existed at that time (see the work “Semasiologicheskie issledovaniya v oblasti drevnikh yazykov” [Semasiological research in the field of ancient languages] by M.M. Pokrovskiy (1895). In 1946, Charles Morris introduced the term semantics into the semantic area of semiotics as one of the branches of the theory of signs along with syntactics (syntax of sign systems) and pragmatics (usage of sign systems). In the most general way, the definition provided by Charles Rycroft can be used as the basic one, “Semantic(s). Initially — the field of philology that deals with the meaning of words. Nowadays it is increasingly understood as studies of meaning in general” (Rycroft: 1995). On the basis of extended understanding of semantics, it can be said that the

subject of semantics includes senses or meanings in any manifestation and in any area of knowledge. A more specialized definition suggests that semantics is “1) all content, information transferred by language or its unit (a word, a grammatical form of a word, a phrase, or a sentence); 2) a branch of linguistics that studies content and information; 3) one of the main branches of semiotics” (Stepanov: 1990).

The specific feature that characterizes the formation of the semantic approach from the historical perspective is that a few theoretical movements with their own subjects and methodologies developed at the same time and later preserved the status of a scientific movement of school, such as: the psychological, or evolutionary, approach (W. von Humboldt, H. Steinthal, A.A. Potebnya and W. Wundt, A.N. Veselovsky, E. Sapir, B.L. Whorf, I.I. Meshchaninov, N.Ya. Marr; the theory of linguistic worldview based on studies of folklore and “folk psychology”); the comparative-historical approach (semantics as an individual branch of linguistics including semasiology, historical etymology, and the historical laws of semantics (M.M. Pokrovskiy, M. Bréal, O.N. Trubachev, É. Benveniste, Th. V. Gamkrelidze, Vyach. Vs. Ivanov, V.N. Toporov, Ya. Grot, V.V. Vinogradov, Yu.S. Sorokin, V.V. Veselitskiy, R.A. Budagov, Yu.A. Belchikov); the syntactico-semantic, or logico-semantic, approach (identification of the first “semantic primitives” and the rules of their transformation, paraphrase, and functions; B. Russell, L. Wittgenstein, A.J. Ayer, W.O. Quine, J.R. Searle, P.F. Strawson, Z. Wandler).

The variety of spheres where the semantic approach can be employed and the manifoldness of theoretical branches are complemented, on the one hand, by fragmentation of the content of each of the resulting spheres and, on the other hand, by addressing adjacent areas of knowledge. For instance, linguistic semantics is divided into: cognitive linguistic semantics (which studies conceptual constructs and the manifestation of knowledge based on everyday activities and personal mentality); lexical linguistic semantics (which explores meanings within a word and its lexical elements — morphemes and lexemes); formal linguistic semantics (which interprets natural languages based on mathematical methods of description); generative linguistic semantics (G. Lakoff’s theory of initial semantic structures and generative grammar developed by N. Chomsky), historical linguistic semantics (which studies the meanings and transformations of lexis, words, phraseologisms, idioms, and other constituent parts of a language in the context of worldview systems of different epochs; the issues connected with genesis and transformations of the archaic figurative ideas of culture explored by O.M. Freidenberg and V.Ya. Propp); the functional-semantic approach (which views a language as a method of communication and a system of expressive means — the “teleological principle” developed by R.O. Jakobson and N.S. Trubetskiy; K. Bühler’s theory of three functions of language; the theory of language as a system of functional-semantic fields connected with the semantic categories of temporality, modality, and aspectuality developed by A.V. Bondarko).

International and Russian science have accumulated an extensive bulk of materials and theoretical and practical experience in all areas of knowledge connected with semantics. It is hardly possible to identify a single branch exploring the implementation of semantic approaches in pedagogy as an individual phenomenon. As of today, in Russian science, there are several semantic approaches used in pedagogy.

The pedagogical aspects of the semantic approach based on semiotics from the perspective of sensemaking have been developed by a few authors: A.B. Solomonik (building the process of education with a gradually increasing share of abstraction and the volume of information in accordance with the stages of intellectual development in children based on implementation of differentiated sign hierarchy into the pedagogical process: natural sign systems, figurative systems, language systems, recording systems, and formalized first- and second-order systems) (Solomonik: 2010); G.V. Ivanova (the methodology of step-by-step acquisition of the meaning of signs and symbols to achieve the task of moral upbringing of preschoolers based on the following hierarchy: word-sign, feeling-sign, image-sign, idea-sign, schematization as a sign, model as a sign: child’s “encounter” with a symbol/sign; “discovery” of a semantic symbol/sign and variants of its usage; correlating a symbol/sign with others within the system “allowed/forbidden”; extending the initial meanings; making attempts at decoding symbols/signs in different languages and their variable usage in real-

life situations; “creative work” as a child’s attempt at creating their own simple signs and symbols and organization of an ecological path with iconic signs) (Ivanova: 2010; Ivanova: 2009); A.A. Sukhanova (development of the technology of work with educational texts based on activation of semiosis, coding texts using a predetermined algorithm and their decoding by transforming graphic, verbal, and alphabetical signals into the volume of the source text for the purpose of development of such competencies as “reception and processing of information, identification of objects, recording the results of cognitive activity, planning and regulation of activity, operating a wider and deeper content”) (Toporov: 2006).

The pedagogical aspects of the semantic approach based on linguistics have been researched by the following authors: S.I. Lvova (in the framework of lexical semantics, a methodology of improving the competence of students in the Russian language developed based on the ability to view the structure of a word against a broad structural and semantic background by comparing it with the words having the same root or structure, etymologically cognate, externally similar in terms of composition, etc., relying on the morphemic structure of the word, graphic and phonemic variants of morphemes) (Lvova: 1993); A.Yu. Ustinov (the methodology of studying semantic means of language modality as a multi-level system in the school course of the Russian language based on the functional-semantic approach in linguistics using the principle of analyzing the meaning/sense first and then moving to the form and the functions of linguistic units for formation of communicative competences in students, their ability to convey different extralinguistic aspects in the process of communication, identify the speaker’s attitude to reality, assess all participants of the process of communication, and enrich their vocabulary) (Ustinov: 2009; Ustinov: 2008).

The pedagogical aspects of the semantic approach at the intersection of psychology and semiotics are explored in the works by the following authors: T.G. Galaktionova (“semiotic didactics” of encouraging modern students to read more based on H. Gardner’s classification of different thinking models: musical-rhythmic, verbal-linguistic, logical-mathematical, interpersonal, intrapersonal, and existential and corresponding methods of semiotic and semantic analysis of “texts” containing different imagery in different cultural codes, symbols, texts of various levels and genres: musical, manual, business texts, authentic, folklore, sacred, etc.) (Galaktionova: 2013); I.V. Shadrina (the methodology of teaching mathematics in primary school based on developmental psychology, on the one hand, which suggests step-by-step movement from objective visual signs to cognitive visual signs and then to symbolic visual marking, the processual and enriching stage of comprehension of the mathematical image of the world, and, on the other hand, the genetic historical principle of comprehension of the images of mathematical objects through reconstructing of the ways of their design from natural realia emphasizing the special role of the geometric component of studies — from geometry of “shape and position” to geometry of “measure” (Shadrina, 2013; Shadrina, 2009); research into visualization of the thinking process — M.M. Subbotin (the method of logico-semantic modeling based on “semantic networks” and graphs principle) (Subbotin: 1981) and V.E. Steinberg (technologies of visual didactic regulations of the logico-semantic type as an adaptation to the pedagogical methods developed by M.M. Subbotin and consolidation of the mind maps developed by T. Buzan, the clustering method by Gabrielle L. Rico, etc. (Steinberg: 2000; Steinberg: 2002; Steinberg: 2015).

Remaining challenges. Summarizing the above, it can be concluded that pedagogy turned out to be the weakest link in the sphere of adoption of new semantic approaches in Russian science. Semantic approaches are now at the stage of establishment in Russian pedagogy and, as of today, the following individual methodologies have been established: the genetic-historical semantic aspect in teaching mathematics and languages; semantic areas corresponding with different thinking models; addressing the task of moral upbringing and development of communication skills from the perspective of semantics; semantico-logical visualization of the processes of information research. There is no pedagogical research in the sphere of art and cultural studies at school from the perspective of semantics. No models establishing the connection between the content of education and socialization systems based on the semantic approach have been developed. Finally, there is no model platform for practicing didactics based on semantic approaches.

METHODOLOGY

Therefore, the objective of this research is the following: creating an integral pedagogical model of optimization of the content of education based on semantic approaches considering the socialization codes, cultural codes of culture genesis, and code hierarchy of various types of intelligence.

To achieve these goals, it is necessary to perform the following tasks: to determine the methodological foundation of the model based on the semantic approach; to identify the role of an artistic cycle as a model platform for optimization and visualization of the content of education based on semantic approaches; approbation of the model by teachers.

Methods. We take it as a premise that the pedagogical process is a systemic part of the semiotic system of one's involvement within culture, a small "semiosphere" in the "semiosphere" (Lotman: 2000) of the culture of humanity as a whole. In terms of the definition of culture, we rely on the opinion of Yu.M. Lotman, who said that "all material of the history of culture can be viewed from the perspective of certain meaningful information and a system of social codes that allow us to convey such information in the form of certain signs and share it with human communities<...> as a historically developed hierarchy of codes<...> connected with the fundamental forms of public consciousness, team management, and personal self-organization" (Lotman: 2002).

Formation of senses and the initial level of semantics in the culture of humanity were based on the essential mythological worldview in two variants of its historical levels: the initial totemistic model and the cosmological semiotic model (Kalinina: 2011). For specification of the first-level mechanisms, the research into the historical semantics of culture carried out by O.M. Freidenberg, who developed the theory of semantic image (Freidenberg: 2008), is of great significance, as well as certain works by I.V. Kalinina in this sphere, who identified the specific features of equivalent semantic images at the level of totemism as a pre-cosmogonic system of world perception (Kalinina: 2011). In our choice of particular codes of the mythological semiotic model we rely on the theory of binary opposites within structural semiotic anthropology developed by C. Lévi-Strauss (Lévi-Strauss: 2001) and the conceptual framework developed by the researchers from the Moscow-Tartu School of semiotics, such as Vyach. Vs. Ivanov (Ivanov: 2007), Yu.M. Lotman (Lotman: 2000; Lotman: 2002), E.M. Meletinsky (Meletinsky: 1976), and V.N. Toporov (Toporov: 2006a; Toporov: 2006b; Toporov: 2010), who used double sign-identifiers as a mechanism for the description of the universe of world models (the world tree scheme) and the means of conveying the cultural meanings of the myth, ritual, folklore, literary pieces, architecture, all kinds of visual arts, and objective-spatial environment, as well as modern authors working in the same paradigm, such as L.F. Chertov (Chertov: 2014). C.G. Jung's theory of archetypes complements the structure of epochal worldview types by basic essential images (Jung: 2005). The works by R. Barthes (Barthes: 2008) and M. Eliade (Eliade: 2005; Eliade: 2006) about the functioning of mythological meanings in modern culture complement the methodological framework.

As the core thread of the socialization model, we chose the model of integrity of the semiotic structure of personal socialization by Yu.V. Rozhdestvensky (Rozhdestvensky: 2000). The connection between the initial models of semiatization of the cultural environment of humanity and the mechanisms of personal socialization is possible based on J. Piaget's ideas, according to which stages of historical-cultural genesis of humanity are repeated within individual development of each person (Piaget: 2004), and the theory of multiple intelligences by H. Gardner (Gardner: 2007).

RESULTS

The structure of the suggested model of optimization of the content of education, considering the socialization codes, cultural codes of culture genesis, and code hierarchy of various types of intelligence, includes three levels.

The level of socialization. The basic level is established based on the integral semiotic structure of personal socialization suggested by Yu.V. Rozhdestvensky. It correlates with the primary structures of the mythological worldview since “sign formation in a primary society, i.e. a society where there is only the first stratum of culture exists, shapes the sign formation system in general” (Rozhdestvensky: 2000). General-purpose, or unifying, and special-purpose systems are basic components of the semiotic structure of personal socialization. General-purpose systems include languages (the main means of communication and unification of society), number systems (the most effective means of arrangement and organization of the world using temporal and spatial parameters), games and rites (the means of upbringing and organization of society). Semiotic systems of special (operating) purpose include signs used in prognostics (superstitious beliefs/predictive signs/fortune-telling), management (measures/guiding landmarks/commands), applied (homeware/costumes/architecture) and non-applied (music/dancing/pictures/ornaments) arts. Summarizing the functioning of the whole structure, Yu.V. Rozhdestvensky came to the conclusion that “the whole set of sign systems does not only enable society to be formed as a structural whole but also allows us to explain the nature of socialized mental activity. Languages and number systems require conceptual thinking; on the contrary, rites and games develop spiritual experience of a person and lead to changes in their self-consciousness. Prognostics develops predictive abilities, musical arts — imagination, applied arts give one a feeling of comfort, and managing signs provide an ethical aspect to personal experiences” (Rozhdestvensky: 2000). According to the laws of culture, civilization does not cross the boundaries of the primary “folklore stratum of culture” (Rozhdestvensky: 2000) (pre-literate/mythological), and the emergence of the following levels (industrial civilization/post-industrial or information society) of culture does not invalidate the previous achievements; instead, it leads to enrichment of culture based on its restructuring. The following general-purpose systems are formed: language (oral speech, written record, publishing, and information technologies); calculation systems (systems connected with the human body and tangible objects with further development of abstract written algorithms of arithmetic operations; from geometrical constructions to the concept of quantity and algebraic calculations; from Euclidean geometry to perspective, spherical, and fractal geometry, etc.); games (folk games, sports games, intellectual, military, and business games); rites (pagan, church, state, judicial, educational, etc.). Special-purpose systems evolve in the same direction: classification and experimenting turn superstitious beliefs into scientific knowledge; predictive signs develop into philosophical systems; fortune-telling — into prognostic systems; commands transform into management systems applying to teams, organizations, communities, and state systems; automated and computer-aided management systems.

The psychological level. H. Gardner’s theory of multiple intelligences describes intellectual abilities in terms similar to the codes of the socialization system suggested by Yu.V. Rozhdestvensky. According to H. Gardner’s theory, there are eight types of human intelligence: verbal-linguistic, logical-mathematical, musical-rhythmic, bodily-kinesthetic, visual-spatial, intrapersonal, interpersonal, and naturalistic (Gardner: 2007). Historical research carried out by H. Gardner showed that over the history of humanity, different types of intelligence have been in demand to varying degrees and in various combinations. H. Gardner believes that musical-rhythmic intelligence, which is highly specialized at the modern stage of development, has been more in demand over the history of humanity than logical-mathematical intelligence. These dynamics are also reflected in H. Gardner’s system, where quite late, only under the influence of aggravated environmental problem, the naturalistic type of intelligence was included, which suggests activity in such spheres as protection of the environment, agriculture, veterinary medicine, biology, ecology, genetics, etc. Considering the fact that during the early history of humanity the prevailing activity was hunting, it is natural to assume that the naturalistic, bodily-kinesthetic, and musical-rhythmic types of intelligence were more relevant for its implementation. Each historical epoch has had its own configuration of the set of sought-after thinking types. The hierarchy of intelligence types developed by H. Gardner reflects the established system of value priorities existing at the moment of its creation.

The verbal-linguistic type of thinking reflects the major role of language as “the only sign system the signs of which are appointed by this system (the system describes itself)”, a universal intermediary, and the main index system for signs within all systems in all spheres of socialization and culture genesis. Language includes such activities as nomination (assigning names to objects), establishing the rules of procedures, explaining operations, interpreting meanings, and synonymization of signs. These functions of language are associated with the primary process of culture genesis and, correspondingly, “the material for searching for cultural facts are names<...> all terms and all those words and expressions that can be used as proper names” (Rozhdestvensky: 2000). The verbal-linguistic type of thinking is connected with the establishment of worldview describing the world with names of things. The core of the logical-mathematical type of thinking is counting means. At the primary stages of culture genesis, counting means represented the initial means of arrangement and organization of the world using temporal and spatial parameters, and this was their main point. The priority of the first two types of thinking, verbal-linguistic and logical-mathematical, is due to the fact that they correlate with the main axis of general-purpose systems — language and counting means — and are significant for all types of special-purpose systems.

The naturalistic type of thinking is associated with the primary natural habitat of a person and correlates with systems of counting means and such management signs as guiding landmarks. They serve as a means of making oneself familiar with natural space and its inclusion into the sphere of culture. Environmental activities based on the naturalistic type of thinking are connected with the sign system of prognostics as the result of summarizing the observations of natural phenomena. The visual-spatial type of thinking is connected with the sign character of the systems of applied arts denoting the parameters of the objective world of the artificial habitat of man and the sign nature of technologies that support the creation of such habitat. Architecture plays a special role in this process since it denotes both functional, as well as worldview and aesthetic, meanings of worldview models, which indicates its connection with a general-purpose system (counting means) and the sign character of non-applied arts. Creating spatial models of worldviews also falls within the scope of the visual-spatial type of thinking, which means that it also covers the functioning area of the signs used in visual arts (painting, sculpture, graphics), ornament, and choreography. The bodily-kinesthetic type of thinking responsible for the coordination of eyes and limbs and the ability to manipulate external objects correlates with the signs used within technologies of applied arts, symbols of non-applied temporal arts (music, choreography), games, and rites as general-purpose sign systems integrating the ideas of bodily organization of worldviews. The musical-rhythmic type of thinking is directed towards understanding the semantics of sound and creation of a dynamic worldview on relations between man and the universe. This type of thinking involves the general-purpose system of counting means (rhythm and meter) and the special-purpose system of non-applied arts (music, choreography). The other four types of thinking are characterized by aesthetic comprehension of the world.

The intrapersonal type of thinking correlates with the internal private vision of the world based on intuition and emotions, which was initially perceived as a sacred action of comprehension of the initial matters of the internal transcendental worldview. At the primary level of the folklore world model, the intrapersonal type of thinking was connected with the signs used in rites as a basic general-purpose system in the course of organization of sacralized practices relating to older times in the form of traditions. The system of prognostic signs complemented sacralized practices in terms of their quest for the images of the future. The abilities of people with the intrapersonal type of thinking to generate ideas and theories, suggest hypotheses and forecasts, and offer unconventional interpretations of the unknown can be traced to such socially valuable practices. The interpersonal type of thinking is responsible for the implementation of social integration and organization of joint activities. People with this type of thinking have a set of abilities that provide them with access to all general-purpose systems, signs used in prognostics and the management of special-purpose systems. A high degree of communicative and speaking abilities represents Language. The ability to analyze, synthesize, and think several moves ahead represents Counting means. Possessing the knowledge of

mechanisms for organization of social structures expressed in primary model signs is connected with Rite. The ability to manipulate technologies of management of people's spontaneous actions is based on the knowledge of patterns and psychological aspects of Game. The ability to predict the behavior of people is connected with the sphere of prognostics. Knowledge of the rules of social interactions suggests competence in the sphere of management signs — in the first place, commands. As opposed to the previous types of thinking, the interpersonal type of thinking based on usage of the maximum number of socialization systems is directed towards the reconstruction of the images of external (social) configurations of worldviews. The other two types of thinking are characterized by ethical comprehension of the world.

The culturological level. As we see, the integrated semiotic structure of personal socialization in its interaction with the system of thinking types includes the ideas of all existing worldviews that have been developed by humanity as a result of culture genesis. First, it includes the worldview expressed in linguistic nominations. Second, it refers to worldviews created within applied and non-applied arts that are reflected in structures arranged according to temporal and spatial parameters. The worldviews covered by spatial structures include the following models: the natural environment of the habitat involved in the sphere of culture; models of pictures depicting artificial habitats, including virtual art images; models of the world formed based on symbols and functions characteristic of the human body. Transcendental worldviews adjoin them as the structures denoting the internal core of the cultural universe. The external outline contains the external (social) configurations of worldviews. Dynamic worldviews are associated with regulation of temporal parameters. This corresponds with Yu.M. Lotman conclusions that "each coding type of historical and cultural information turns out to be connected with fundamental forms of public consciousness, team management, and personal self-organization" (Lotman: 2002). According to Yu.M. Lotman, viewing culture as a "means of data storage and transfer" and an "open text" allows one to "employ the general methods of semiotics and structural linguistics to studies of culture" and use "the historically developed code hierarchies" (Lotman: 2002). Culture is based around the nucleus of the primary mythological (archaic, folklore, traditional) world model as an invariant of all further epochal variants. It contains essential cultural codes (zoomorphic, botanical, nutritive, astral, color, geometrical, and numerical symbols), means for the structuring of the universe (binary opposites) and its integration (archetypes, mythologems), as well as methods of their recoding and reinterpretation (equivalence, mediation, inversion, and metaphors). One way or another, all of the following historical models use the language of the primary (archaic) model, so they can be viewed as variants unfolding over time.

The totemistic semantization system, which appeared based on tribal social organization, is associated with the emergence of zoomorphic, botanical, nutritive, and astral codes. They implemented in the image of a "beast" (a totemic beast, horn, claw, or fang), "tree" (the spirit of a tree, a totemic tree, sacred tree, branch, seed), "mountains" (stone), and "sun" (a ray of sunshine). The cosmological semantic system, which developed based on the processes of formation of stratified societies, provided cultural codes with a higher level of abstraction. These codes included geometrical and numerical symbols, binary oppositions of segmentation and structuring of the world, as well as archetypal images (the World Tree, the World Mountain, heavenly Father/Wise Old Man, and earthly Mother/Mother Goddess). Numerical and geometrical symbols possess the highest level of abstraction. At the same time, geometrical symbols can be viewed as graphic images of numerical symbols that possess spatial, temporal, psychological, and other characteristics. With the help of geometrical symbols, it is possible to model the structure of mythological cosmos and sacralized spaces, the social organization, marital and kindred relations, ethical frameworks, psychophysiological conditions, the imagery of applied and non-applied arts (Toporov: 1980). Within this system, figure 1 is the point (the beginning and the ending), the center, the unity opposing variety. A circle (sphere) is viewed as the emanation of the point, a symbol of harmony/perfection, the unity of the finite and infinite, the feminine aspect, the image of Cosmos (within the Chaos/Cosmos opposition) and the cyclical nature of time. Figure 2 identifies the oppositional parts within any integral whole, for instance, the yin-yang symbol. Flatness as the image of earthly life can be considered the geometrical equivalent of figure 2. Based on the World Mountain imagery, figure 3 (triangle/pyramid) is the mediator between the horizontal and vertical axes, unity of the spirit and

matter as opposites, and the symbol of the union between Heaven and Earth, male and female. Figure 4 (square, diamond) as a horizontal projection of mythological cosmos represents the sign of earth and symbolizes stability, equality, honor, and the male aspect. Based on identification of opposite concepts and images, binary codes create an agonal dynamic model of mythological cosmos. The oppositions between the structures of space and time are fundamental. Spatial oppositions include such concepts as top/bottom, heaven/earth, earth/underworld, left/right, and west/east. Temporal oppositions include the following: day/night, beginning/end, winter/summer, eternity/moment, and being/nonbeing. All other cultural codes describing the world and society can be derived from these oppositions: color codes (white/black, warm/cold), natural and cultural/social (fire/water, raw/cooked), social (male/female, us/them, internal/external, sacred/worldly), general and abstract (life/death, odd/even, happiness/unhappiness, luck/adversity) codes, etc. Value, aesthetic and other evaluations can also be drawn from these oppositions. The integrity and structuredness based on symmetric relations and comprehensiveness of the closed form of a mythological chronotope represent an aesthetic imperative as such. Its spatial binary orientations are, at the same time, ethical orientations. Top symbolizes heaven, light, divine grace, life, eternal values, the heights of spirit, and good in general. Bottom is associated with the underworld, darkness, death, lack of divine grace, rot, malign desires, and evil. Total symmetry of binary code structures allows us to join different codes into endless code sequences. The initial grouping of code systems (zoomorphic, botanical, numerical and other codes) generates higher levels of operators of the system of the world's proto-elements (fire, water, air, and earth) and the cyclical tetrad of birth, growth, degradation, and death, etc. The main functions of the transformation of the structural binary units are: equivalence (everything within everything), metaphoric (each further image or myth is a metaphor for the metaphor for the previous one), mediation (substitution of a more polar opposition for a less polar one, stringing meanings, their folding and unfolding: the life/death opposition is substituted for the concept of young/old, bride/groom entering a new circle of life in their children), and inversion (turning the positions of binary structures upside down: life is equated with death and vice versa) (Toporov: 1982). The functional interdependence of the primary elements of the mythological universe enables their fusion into a single integral image, such as the archetype of the World Tree. The World Tree (cosmic, heavenly, the Tree of Life, the Tree of Knowledge, the Tree of Fertility, the Tree of the Center, the Tree of Ascent, the Anti-tree of the other world) reintegrates time and space as well as all binary oppositions and illustrates the mechanisms of transformation of code sequences. With its help, the world gets structured and acquires unity. It represents the center of the world and can be transformed into the World Mountain, the World's Primal Man, a cathedral, a column, stairs, a cross, or a throne. Along the vertical axis, the World Tree connects three main spatial zones: heaven (branches), earth (trunk), and the underworld (roots). Astral bodies, the whole animal world, ethical and aesthetic values are distributed across these zones. The horizontal structure of the world is described through the World Tree with a tree in the center, two pairs of directions (left/right, in the front/at the back), and four cardinal directions (east, west, north, and south). The World Tree is used to describe all conceivable temporal patterns: the division of the year into seasons, months, weeks, and days, movement from the past (roots) through the present (trunk) to the future (branch), life of the kin, life and death (the Tree of Life and the Tree of Death), and immortality (which is identified with the core of the tree). The division of the world in the vertical and horizontal directions transforms the image of the World Tree into numerical (three levels, four cardinal directions, and seven as an integral image of the tree) and geometrical codes (the point/center, square/horizontal projection, circle/orbit of temporal cycles) (Toporov: 2010).

DISCUSSION

The realia of the mythological worldview described in art coincide with the original basis of formation of socialization structures and the system of thinking types. Cultural codes can serve as a basis for the model of optimization of the content of education considering socialization processes, different types of intelligence, and the following observations. First, as Yu.M. Lotman wrote, “the total number of the main types of cultural codes will be relatively small, and a significant variety of historically established cultures emerges due to complex combinations of a few relatively simple types” (Lotman: 2002). Second, as analysis of the specific features of cultural codes has shown, their universal character is explained by the fact that they possess ontological, symbolic, psychological, axiological, aesthetic, and other meanings and function as gnoseological categories. Finally, cultural codes are directly related to the specific features of an artistic image, which possesses the ability to convey information in a short or emotionally colored form.

Mythological mechanisms of translating the information contained in the external environment into the language of culture correspond and coincide with the methods of comprehending structuralism in the sphere of art. Every student has initial knowledge about the mythological foundations of language, counting means, rites, and games as a result of early socialization and familiarization with the basics of folklore culture: fairy tales, minor folklore forms (riddles, counting rhymes, nursery rhymes, and songs), children’s games, rules of social behavior (superstitions, patterns of everyday behavior, gesture symbolism, and organization of the living environment). When the initial knowledge is complemented with scientific achievements in historical etymology, comparative linguistics, social anthropology, psychology, cultural studies, and mythology, students get a primary mythological spatial-temporal worldview and primary instruments for emotional, conceptual, and value comprehension of the “texts” of culture and their own experience. It should be mentioned that they explore both matters in the context of their experience that has been formed within this very culture. Establishing the correlation between various cultural codes and different types of thinking allows one to choose an individual preferable learning trajectory for each student using different recording and coding number systems. We suggest the following multilevel model of implementation of structural-semantic approaches into educational practice representing work with cultural codes, language, and approximate combinations of thinking types (Table 1). Due to the exceptional position of language as a means of creating signs and an intermediary between different sign systems, a separate column has been assigned to language as a reminder that it is a good idea to start work from analysis of semantic and etymological data.

Table 1. The structure of a multilevel model of implementation of structural-semantic approaches into educational practice

Age	Methods of applying the structural-semantic approach to modeling of the educational process		
	Cultural codes	Language	Types of thinking
6–7 y.o.	Basic structures (geometrical and color symbols, binary opposites, and archetypes) represent the basis for creating the conditions for creative experimental activities to be carried out by children and supporting the “syncretism” of children’s thinking.	Experiments with words based on <i>synesthesia</i> (color, music, and sensorial characteristics of words)	bodily-kinesthetic, musical-rhythmic, naturalistic, and spatial
7–8/10 y.o.	Structural elements of the mythological elements as culture-creating mechanisms. Myth as a modeling system, narrative, symbol, and image.	Word and myth (the connection between words and the imagery of myth)	visual-spatial, verbal-linguistic, bodily-kinesthetic, musical-rhythmic, and naturalistic
10–13/14 y.o.	The structures of the mythological model (invariant) as an instrument for studying any “texts” within culture, in any subject matter of education.	Studying the data provided by historical etymology	verbal-linguistic, logical-mathematical, and visual-spatial
15–16/17 y.o.	Mastering the methods of structural and semantic analysis with further exploration of modeling.	Critical analysis of texts and modeling based on different communication technologies	verbal-linguistic, logical-mathematical, intrapersonal, and interpersonal

We chose continuing professional development webinars for teachers held at the digital platform lecta.rosuchebnik.ru created by Rosuchebnik Corporation and on YouTube to approve our model. The webinars were attended by specialists from all regions of the Russian Federation, as well as from CIS countries. Judging by the number of views of webinars over 2018–2019, which reached 8,901, it can be concluded that teachers showed great interest in the implementation of our model in the course of teaching art subjects. The list of webinars on YouTube can be found in the Internet resources section (Epokhalnye... : 2018; Srednieveka – Rennans: 2018; BarokkoiKlassitsizm: 2018; Traditsionnoe ... : 2018; Obraz... : 2018; Russkaya ... : 2018; Makroskos... : 2018; Bozhestvennaya... : 2018; Gonchar... : 2018; Obraznost... : 2018; Traditsii... : 2018; Skulptura... : 2018; Motivy... : 2018; Tema "Bogini-materi"... : 2018; Lend-art... : 2019; Mifologicheskie... : 2019; Osobennosti... :2019; Analizzhivopisinaosnove... : 2019; Analiticheskie... : 2019; Analiz zhivopisi... : 2019; Analiz proizvedenii... : 2019).

CONCLUSION

Semantization of the structure of the educational process and its content is connected with the basic existences of man, comprehension of the meanings of life and the surrounding world.

Semantic approaches allow one to create an integral pedagogical system of optimization of the content of education considering socialization codes, cultural codes of culture genesis, and code hierarchy of various types of intelligence based on the conjunction of all of the above-mentioned systems and subsequent activation of semiotic structures.

The subject matter of art and other subjects in the sphere of cultural studies at school represents the most suitable modeling ground for practicing pedagogical approaches due to their connections with the figurative structures of culture genesis.

By and large, structural-semantic approaches represent the foundation for the development of the essential aspects of optimization of the model focusing on the interconnection between the content of education, research methodologies, and the structure of educational process aimed at the formation of creative and research abilities of students as well as their socialization.

Research into invariant semantic structures makes it possible to create an optimal model of a toolkit encouraging development of logical thinking, conceptual framework, creative thinking, aesthetic perception, and the ability to experience intense spiritual emotions leading to development of universal ethical values and mechanisms of personal and creative self-improvement.

The connection with the sign systems of culture provides compactness of conceptual formulas and visualization of cognition methods.

In the areas related to the historical aspects of any branch of knowledge, semantics allows one to trace the genetic aspects of any phenomenon (from protoforms of words, objects, phenomena, and events to modern forms of language and knowledge). Due to the fact that the stages of historical sense-making in culture and stages of personal development of each person coincide, there is an opportunity to develop adequate pedagogical methods of introducing students to studies of language, mathematical symbols, and sign systems of applied sciences relying on the achievements in the sphere of semantics and developmental psychology.

The semantic approach is oriented towards generation of different thinking types, synthesis of which allows one to develop the following characteristics: independence of thinking activities, social adaptation skills, collective problem-solving, and the ability to combine and transform work methods depending on the situation independently.

Semantic approaches provide students with an opportunity to analyze real-life situations connected with socialization, psychology, and communication competences.

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