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FORMATION OF CONCEPTS OF TIME AND SPACE IN PHILOSOPHY, PEDAGOGY AND PSYCHOLOGY AT DIFFERENT STAGES OF SOCIAL DEVELOPMENT

Abstract. The article dwells on the formation and development of the concepts of time and space in philosophy, pedagogy and psychology at different stages of social progress. The philosophical science has a long tradition of studying space and time. The problem interested wise men and first scholars because the questions connected with it are versatile and have always aroused interest of researchers in various fields. Pedagogy and psychology have treated this problem from the point of view of revealing the specificity of perception of space and time by preschoolers and the method of orientation in space and time; pedagogical conditions of development of orientation in space and time; and interrelationship between the concepts of space and time and the linguistic nominations of these characteristics. Recent decades have seen growing interest in the works of specialists in the sphere of developmental disorders and the problems of formation of the concepts of space and time in children with disabilities. Currently, the problem of the study of special features of the concepts of space and time in preschoolers with disabilities remains to be urgent and needs further investigation. The article characterizes the works and conceptions of certain authors. In her scientific publications, K. A. Semenova has found out that preschool children with cerebral palsy demonstrate impairments of the structure of sensory cognition as such, which functions as a system of interanalyzer connections. I. Yu. Levchenko writes about the inadequate formation of higher cortical functions causing immaturity of spatial concepts. O. V. Titova points out that the development of spatial concepts is critical for the process of the child's social adaptation and creates the basis for successful acquisition of learning activity.

Keywords: concepts of space; concepts of time; space; time; preschool children; children with motor impairments; orientation in time; cerebral palsy; CP.

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Problems with formation of spatial and temporal concepts represent one of the most general tendencies of non-typical development [15]. Immaturity of orientation in time and space in children with disabilities at various age-related stages of development was emphasized by E. S. Kalizhnyuk, N. V. Simonova, N. Ya. Semago, O. V. Titova, L. I. Solntseva, and others.

Poor formation of spatial-temporal concepts is one of the causes of developmental disorders in reading, writing and counting. In spite of a large number of investigations in this field, the issue of the mechanisms of formation of spatial-temporal concepts in ontogenesis and impaired development remains to be urgent.

Studying the specificity of formation of spatial-temporal concepts in pre-school children we have set out to answer the following questions. How did the scholars of various historical periods understand the role of orientation in space and

time in the life of man? What did the specialists in philosophy, pedagogy, psychology and teaching methods write about this issue? How long ago were these problems tackled for the first time?

Having studied the literature on these questions, we have made a conclusion that orientation in space and time lies at the basis of the human cognitive activity.

From the point of view of the philosophical approach, space is a concept of human consciousness that reflects the form of the world's existence and its heterogeneity. Time is a form of the course of psychological and physical processes presupposing changeability.

The first author of the documented reference to time was the ancient Egyptian wise man Ptahhotep. One of his maxims about time ran as follows: “Diminish not the time of following the heart; it is abhorred of the soul” [9].

The philosophers of ancient Greece and ancient Rome, including

Parmenides of Elea and Heraclitus of Ephesus, described the nature of time in their treatises [9].

Thus, the concept of time appears when people perceive the alternation of events, change of objects and processes connected with the whole humanity. The spatial-temporal concepts have gone a long enough way of formation in science.

The first concepts related by the philosophers of Antiquity were associated with the world of solid bodies which occupy certain space.

The ancient Greek philosophers Leucippus and Democritus believed that everything consists of microscopic particles (atoms) which move freely, collide with each other, and combine in space in a kind of vacuum. Leucippus argued that atoms meant being, and emptiness meant non-being; and the atoms and the empty space serve as the beginning of the world. Atoms exist eternally; consequently, there emerges eternal time.

Democritus further developed the ideas of Leucippus and created a theory of structural levels of matter – physical and mathematical, where the physical level includes atoms and empty space (void), and the mathematical level consists of amers (spatial smallest amount of matter). This teaching shows us two kinds of space: continuous physical space as a receptacle, and mathematical space based on amers as

scaled units of extension of matter. Thus, Democritus created a theory about the nature of time and motion.

The issues of existence of time and its divisibility were studied by Aristotle. He drew the conclusion that time does not exist without motion, but is not motion in its essence. Time can be measured with the help of any periodical unit of motion; it only requires maximum speed motion. The scientist studied the space which, according to him, represents the relation between objects, an objective category and a property of natural things [9].

Augustine of Hippo put forward a theory about the relationship between the freedom of the human will, the grace of Christ and predestination. In his works, he investigated the forms of existence of the present: “present-past”, “present-present” and “present-future”.

G.W. Leibniz expressed a supposition that space is determined by the position of the bodies – “one near another”, that time is the order of alternation of phenomena or body states – “one after another”. Thus, space and time are the properties of the things themselves.

V. I. Vernadskiy singled out and described biological time. In his opinion, all living organisms have biological clocks which are either switched on or off in response to various stimuli. The scholar believed that living organisms live with orientation to the present –

future, and the society organizes its space and time [6].

Working out his theory of relativity, Albert Einstein arrived at the conclusions directly associated with space and time: the theory suggested by the scientist excluded the notions of absolute time and space and emphasized the fallacy of traditional interpretations of time and space; space and time depend on the nature of motion and the interaction between material systems. The Einstein theory refuted the subjectivist and *a priori* interpretations of the essence of space and time which contradicted its conclusions.

The Russian religious philosopher P. A. Florenskiy considers the problems of eschatology within the metaphysics of space and time.

His theory of ostensibility (addressed causality) of space-time dream, theory of geometrical closure of physical space-time, and the arhythmological conception of discontinuity of the world (“cracks” of being testifying to the nearness of the End) became characteristic of his works. The philosopher’s theories may be treated as ontognoseological methodologies of detection of the cognitive threshold of human reason (theory of truth antinomy).

Anthroposophy (the founder of this theory was R. Steiner) and the Max Heindel theory are variations of theosophy founded by E. P. Blavatskaya. R. Steiner was under the

influence of the German philosophical and scientific thinking (Goethe, Fichte; Haeckel). M. Heindel demonstrated good knowledge of the scientific-natural ideas of his time. The philosophers of this school attached great significance to the mission of Jesus Christ. The structure of the human being described by them has much in common with the ideas related by the ancient Greek thinker Aristotle in his treatise “On the Soul”. The scientists argued that the human being consists of seven principles, or the so-called “bodies”: 1) physical body; 2) ether-body; 3) astral body (Steiner), body of wishes (Heindel); 4) “ego” (Steiner), reason (Heindel); 5) self-spirit (Steiner), human spirit (Heindel); 6) life spirit; 7) man of spirit (Steiner), divine spirit (Heindel).

And the suggested sequence may be interpreted in terms of description of the human evolution, which is presented in theosophy. The word “body”, according to theosophists, was chosen to describe higher, supersensitive forms of human existence solely due to the limitations of linguistic means of expression that could be used to describe the processes in the world beyond reality.

Furthermore, it seems promising in the given conception to be able to draw a parallel between the so-called level-based psychological processes (feeling, perception, sup-

position, and thinking) and the evolutionary stages at which the representatives of various natural categories are. Such analysis could lead to the creation of a comprehensive theory which could be spread not only upon the human being but also upon everything that surrounded them, and, in contrast to theosophy, could be free of the mystic halo.

The formation of spatial-temporal concepts and the development of ability to operate the given categories by children require the participation of the visual, auditory, kinesthetical, tactile and olfactory analyzers. The formation and development of the concepts about space and time is an inborn ability; after birth, the level of formation of these concepts is a most important indicator of the development of intellectual and sensory-motor education [7].

Spatial-temporal concepts of preschool children have attracted the interest of many pedagogues of the past.

In his work "The Great Didactic", J.A. Comenius noted the importance of the role of the parents who should teach their children orient in time and space. And the parent should show, explain and name the phenomena of the surrounding world connected with these categories. The great scholar believed that most of the education takes place during the first six years of the life of the child [10].

J. H. Pestalozzi shared the opinion of J.A. Comenius and argued that pre-school children should have a certain amount of knowledge about space and time. This knowledge facilitates the development of communication and further expansion of the concepts about the surrounding world in preschoolers.

In her pedagogical writings, M. Montessori stressed that a pre-school child should be taught to understand and use the words associated with space and time. According to her opinion, it is necessary to pay special attention to the words "today", "tomorrow", "yesterday", "in front of", "at the back of", "before", "after", "more often", "less often", etc. She suggested acquainting children with the notions "centimeter" and "meter".

The works of the home pedagogues B. G. Anan'ev, M. I. Vasil'eva, E. I. Vodovozova, L. A. Efimova, A. M. Leushina, T. A. Musesyibova, K. V. Nazarenko, V. A. Sukhomlinskiy, T. D. Rikhterman, K. D. Ushinskiy, E. Shcherbakova and others demonstrate considerable interest towards the level of formation and the stages of development of spatial-temporal concepts.

Having singled out two forms of reflection of spatial-temporal concepts – direct and indirect – B. G. Anan'ev believed that they represented the stages of cognition [1; 3]. Both forms are interrelated with each

other, and during the transition from one form into the other, the child perfects himself getting a chance to pass on to the next stage of his development. Mention must be made of the special influence the formation of the children's communication has upon the given processes.

In his works, K. D. Ushinskiy attracted the attention of the readers upon training the preschoolers "to differentiate prepositions of time", as well as to see the difference between the notions of the year, names of the months, days of the week, parts of the day; to recognize the sex and age-related categories: baby, infant, adolescent, teenager, man, woman, old man, old woman. According to the pedagogue's opinion, the corresponding classes should begin at the ages of 6-7 years. The specialists were recommended to keep to the sequence of relating the material and to reinforce it in practical activity [22].

In the book "*Umstvennoe razvitiye detey ot pervogo proyavleniya soznaniya do vos'miletnego vozrasta*" E. I. Vodovozova wrote about the requirement for the children to know the sequence of the seasons and days of the week and their qualitative composition. The preschoolers should know such words as "noon", "twilight", "younger", "older", etc. and be able to use them. The author advises the teacher to observe the position of the sun together with the children [8].

L. A. Efimova dealt with the question of understanding historical time by the children, in the context of which time is a kind of stimulus. In her research, the pedagogue studies the formation of historical-temporal concepts and works out special methods of teaching.

A conception of formation of quantitative concepts in pre-school children was suggested by A. M. Leushina. She dwells on the regularities of formation of quantitative concepts and the system of development of mathematical concepts in children attending kindergartens. The author also suggested a program of work aimed at the development of counting operations with children aged 3 through 6 years and a system of practical tasks with visual and hand-out support.

In the 1970s, K. V. Nazarenko worked on the development of understanding of the units of time ("day", "night", "seasons"). The author used the method of a talk "about the Earth, the Sun and the planets explaining the two kinds of motion the Earth performs". As a result of research and pedagogical work, the children learned how to observe the alternations of day and night and the change of seasons.

The questions of formation of the spatial-temporal concepts were studied by T. A. Museyibova, who arrived at the following conclusions:

– formation of the spatial-temporal concepts is a long-term process which, as a rule, is over by the end of the pre-school age;

– at the initial stage, the preschoolers learn the words which are more frequently used in their communication;

– while they are learning the spatial-temporal concepts, preschoolers mistake, mix up, or sometimes pair different, often antonymous lexemes (“above – beyond”, “in front – at the back”, “to the right – to the left”, “over – under”, etc.);

– during further practical acquisition of the given concepts, the children begin to differentiate and recognize the meanings of the words. In the course of their speech development, they learn to use them in utterances.

The work by T. D. Rikhterman is one of the most important investigations of the issues under consideration. The author studied the peculiarities of perception of time and suggested various techniques of work with pre-school children. T. D. Rikhterman recommended working by stages: first stage – acquaintance of the children with the parts of the day, when the teacher should use the materials showing the kinds of activity at various times of the day; at the second stage, the teacher is advised to use landscapes, at the third stage – the pictures allowing to pass on to conventional marking, i.e. to marking the parts of

the day with different colors. The scholar suggested introducing the calendar as a system of time measurements [17].

E. Shcherbakova investigated the formation of the concepts “day”, “week”, and “year”, the ideas about the properties of time (one-dimensionality, flow, irreversibility, cyclicity, etc.), and dealt with the practical orientation of pre-school children in time. The author worked out a model of time in the form of a spiral, and the models “Days of the Week” and “Seasons”. These models help the specialists to form spatial-temporal concepts in preschoolers in informal game-based atmosphere.

In their psycho-pedagogical investigation of senior preschoolers, Z. A. Mikhaylova, E. D. Nosova and A. A. Stolyar figured out that the children of this age acquire the verbal system of measuring space. It is based on the sensory system of measuring which is characterized by practical orientation with support of the “scheme” of one’s own body, and then – on the body of a toy or another person, which largely refers to the verbal system of measuring spatial units. The verbal system of orientation in space has a practical nature: direction, spatial relationships and location are not only named but also linked to an objective landmark [2; 4; 5; 16].

L. A. Venger and V. S. Mukhina carried out an experiment which

focused on proving the dependence between the ability to differentiate short intervals of time and longer intervals during which the child has had time enough to perform something. It is difficult for the children to understand the meaning of the words denoting temporal relations due to their relative nature. Preschoolers cannot always clearly see the meaning of the words like “now” – “at present”, or “today” – “yesterday” – “tomorrow” [2; 5].

Thus, philosophical and psychopedagogical analysis of the works on the issues of formation of spatial-temporal concepts in pre-school children has allowed us to make the following conclusions.

- The characteristics of space and time and the problem of acquisition of these concepts have been actively discussed in literature.
- The concepts “space” and “time” have been treated, as a rule, from the point of view of scientific-natural conceptions and as a physical phenomenon of the real world.
- Pedagogy and psychology have treated this problem from the point of view of revealing the specificity of perception of space and time by preschoolers and the method of orientation in space and time; pedagogical conditions of development of orientation in space and time; and interrelationship between the concepts of space and time and the linguistic nominations of these characteristics.

Recent decades have seen growing interest in the works of specialists in the sphere of developmental disorders and the problems of formation of the concepts of space and time in children with disabilities.

Many authors have noted various forms of impairment of perception of space and time in preschoolers (E. S. Kalizhnyuk, 1975, 1976; I. Yu. Levchenko, 2001; I. I. Mamaychuk, 1976; K. A. Semenova, 1968; N. V. Simonova, 1981; M. B. Eydinova, E. H. Pravdina-Vinarskaya, 1959, etc.).

K. A. Semenova has found out that in her research that irrespective of the form of children’s palsy (CP), the patients demonstrate the absence or the inadequacy of the synthesis of separate movements into one whole even if they adequately perceive these movements. Thus, drawing on the law about the central linking function of kinesthesia we can argue that preschool children with cerebral palsy demonstrate impairments of the structure of sensory cognition as such, which functions as a system of interanalyzer connections. [19; 20; 21].

I. Yu. Levchenko writes about the inadequate formation of higher cortical functions causing immaturity of spatial concepts manifested in the body scheme comprehension. Differentiation of the right and left parts of the body is impaired. Many spatial concepts (in front of, behind, between, above, below) are difficult

to acquire. The author notes direct correlation between the severity of the motor pathology and the level of manifestation of spatial disorders [11; 12; 13; 14].

O. V. Titova points out that CP is characterized by motor disorders, speech underdevelopment and a peculiar course of development of psychological functions. The formation of spatial orientation in preschoolers with CP leads to more comprehensive cognition of the outer world by the child. All kinds of children's activity are closely associated with orientation in space and time and with perception of spatial properties and relationships of objects. The development of spatial concepts is critical for the process of the child's social adaptation and creates the basis for successful acquisition of the learning material (counting, reading and writing) [18].

Thus, the problem of the study of special features of the concepts of space and time in preschoolers with disabilities remains to be urgent and needs further investigation.

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