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#### PRACA POGLĄDOWA REVIEW ARTICLE

# PSYCHODIDACTIC DETERMINANTS OF THE DEVELOPMENT OF CHILDREN OF PRESCHOOL AGE

# PSYCHODYDAKTYCZNE DETERMINANTY ROZWOJU DZIECKA W WIEKU PRZEDSZKOLNYM

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#### **ABSTRACT**

The article analyzes the state and trends of the problem of the development of children of preschool age. As a research task, the authors present the results of questionnaires of parents of preschool-age children. The foreign experience of pre-school education is described. The psychodidactic contradictions and perspectives of the development of preschool-age children are outlined.

According to scientists, modern preschool education in the context of globalization changes should be reoriented to the development of the child's personality as the main resource, which determines the progressive movement of society. A modern high-tech world puts the child in front of the child's demands of the level of his education, development and upbringing. Consequently, the study of the psychodidactic determinants of the development of a child of preschool age, which provides a complete psycho-physical and personal development and psychological readiness for studying at school, is relevant. The article analyzes the indicators of the cognitive and extracognitive development of the child, in accordance with the most well-known systems of early education, and determines the factors of influence (determinants) of the mental development of a child of preschool age. For conducting scientific researches, the authors used methods of analysis of normative and scientific literature, statistical, system analysis and generalizations, results of their own empirical studies, materials of questionnaires, method of factor-criterion modeling of spheres of mental development of a child, created on the basis of qualimetric evaluation, etc.

It has been established that pre-school education should ensure the harmonious development of the child's personality, his physical and mental health, to form mechanisms for social adaptation and creative implementation in a living environment in the community of children and adults through the creation of early education technologies that include a balanced mix of development cognitive and noncognitive spheres of the child. In order to achieve the tasks, innovative pedagogical technologies such as modern systems of early development are widely used, the main purpose of which, according to their authors, is the development of cognitive, emotional and noncognitive abilities of the child. Having examined the main (most popular) early-developmental systems of skills formation in cognitive and non-cognitive spheres, one can conclude that there is a need for comprehensive (systemic) approaches to the development of a child's early developmental technology, since none of the systems considered alone can provide a harmonious balanced development of preschoolers in cognitive (ability to read, write, read, analyze text, perform creative tasks, etc.) and non-cognitive (social, emotional, ability to play storyline games, with independence, etc.) spheres. After all, if loads are lacking, then mental development stops, and excessive tension and absolute comfort lead to a stop of the development of the psyche, self-awareness, therefore, only a balanced approach will allow to get a positive result.

**KEY WORDS:** physiology, psychology, psychodidactics, development, child, determinants of preschooler development, mental development, factors of influence on child health, cognitive sphere, systems of early education

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#### **INTRODUCTION**

The mental development of a child of preschool age is one of the most difficult issues which concerns the classical psychologists, neuropsychologists, teachers, sociologists, economists, doctors of general practice, and includes cognitive and non-cognitive spheres, according to which the harmonious development of the individual must take place. "This is the period of the initial actual formation of the personality, the period of development of personal "mechanisms" of the behavior. In the preschool years of the development of the child, the first nodes are tied up, the first ties and relationships which formethe new, higher unity of activity and, at the same time, the higher unity of

the subject - the unity of the individual." [1]. It is at this age that separation of the child from the adult takes place, which creates the preconditions for the formation of a new social situation of personality development, all mental life of the child is formed and its relation to the surrounding world. The essence of this reorganization is that in the preschool age there is an internal regulation of the behavior [2]. As a consequence, the determinants of the development of a child of preschool age are not only the intellectual property created by means of early education systems; but also the question of ability to be implemented in a leading form of activity (game); independence; social and emotional development, their interconnection and interdependence. In this regard,

today, as never before relevant issues of early learning arise from the political, cultural, socio-economic peculiarities of the development of a postmodern, highly-intelligent, developing world in a globalization. As Ukraine integrates into the European educational space, there is a question of changing educational standards and, as a consequence, preparing children for a new educational environment. According to current research conducted using various techniques and tools conducted in European countries and Africa, Southeast Asia, USA, there is a link between the effects of early childhood development and life's success. According to the Nobel laureate of economist James Heckman, according to his graph of return on investment in human capital as the function of the age at which investments are first made, one can conclude that investing in childhood is much more effective than all subsequent programs for the younger age. [3] Therefore, raising the quality of life of children is the most reliable and successful strategy for raising the quality of the population (labor resources), which should be one of interests of the state as a customer, who cares about the development of the quality of life of the population and the preservation of its health.

#### THE AIM

Identify the determinants of the mental development of preschoolers in cognitive and noncognitive domains, analyze the impact of early education on the psychological development of the preschooler's personality and the associated risks to the child's health.

#### MATERIALS AND METHODS

To update the didactic aspects of the problem, we used the methods of analysis of normative and scientific sources, system analysis and generalizations, the results of our own empirical studies, materials of the questionnaire, factor and criterion modeling of the spheres of mental development of the child, created on the basis of qualimetric evaluation.

#### **REVIEW AND DISCUSSION**

The development, in the opinion of most scholars, is that a process that occurs spontaneously, everyday, is not completed and relies on pre-existing tumors. The desire of the child to imitate an adult acquires a primary importance in preschool children. Therefore, on the forefront of the child are the social interactions, communication between people, on the second – the mastery of certain knowledge and skills [4]. With age, the desire of a preschooler to become an adult grows, but can not have a real incarnation, so there is a plot-role game (leading activities of preschool age). The main content of which is the simulation of interpersonal relationships among adults. Consequently, the main result of the development of all activities of preschoolers is mastery of modeling as a central mental ability [5], which in turn contributes to the formation of arbitrary behavior [6]. Education is a specially organized activity that runs exclusively under the guidance of an adult, can not pass spontaneously, always pursues a specific goal (the formation of certain knowledge, skills and abilities). Consequently, such activities will be clearly planned and rigorous enough in terms of scope, so in this situation we have a contradiction, here we no longer have to model a social role on the basis of arbitrary behavior. According to L. Vygotsky, the most effective mechanism of education is to determine the area of the immediate development of the child and the activity within it, it is oriented not on the formed functions, which have already passed certain cycles of development, but on the functions that are forming now [7]. Again we have a disagreement. Education is a completely different kind of activity that will take a leading position in school years.

Psychological literature traditionally distributes early mental development of children under age stage opportunities in premature and late time. In general subject of premature child is not able to adequately absorb, understand and use information through appropriate physical and mental imperfections. Late development does not correspond to sensational periods, and as a result, the process of skills formation and knowledge acquisition becomes less productive. Provided timely development of the information received by the child corresponds to age and psychological peculiarities, therefore ensures the preservation and enrichment of the child's health. So, do not engage in the development of a child - deprive it of the right to the possibility of successful social and life realization. During the questionnaire of parents in pre-schools of Ukraine (fig. 1), most of them (35.3%) said that early development is one of the privileges on the election of the future school, 24.6% - the possibility of early development of successful adaptation of the child school, 16.4% - tries to realize his childhood dream: to visit clubs and sections in childhood, because they had not such an opportunity, 20.3% - parents are afraid to miss something important, irreversible, allowing the child realization in adulthood because visiting the circles is an indispensable element of children's lives, 3.4% - note other reasons (teacher or interesting activities, great location, low price or free of charge).

So, the main motivator, from the point of view of the parents, is the future of studying at a prestigious institution. Yes, thinking about the future is necessary, but the main principle of conducting socio-psychological counseling, invented by Gestalt therapists "here and now", the principle that helps to feel the reality of this life situation is violated. Parents do not think about how comfortable, useful is such a violent development, as it destroys the motivational sphere of the child in relation to future education at the educational institution.

A large part of elite educational institutions requires that the child, at the time of the entry, could freely read and retell the text, could graphically reproduce his name or rewrite sentences, freely owned operations of addition and subtraction, sometimes within not only a dozen, but hundreds, and another number of formed educational skills and abilities. And what then will the children do during the first year of study? The very idea of early development

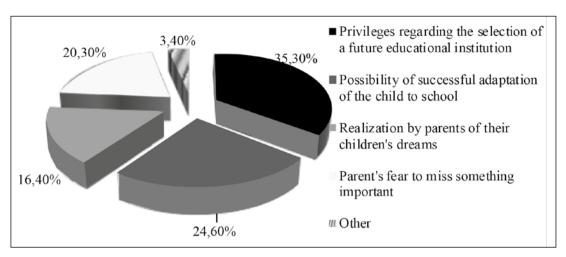


Fig.1. Results of the questionnaire of parents in preschool establishments of Ukraine

under this condition is discredited and becomes a part of the early education (reading, writing, etc.). Psychologists in such cases note that often early education without appropriate social and psychological support causes negative consequences in the child's personal development: the lack of social and natural skills (inability to fasten buttons, to clean things up, general non-autonomy), the formation of various fears and excessive anxiety, emotional dysfunctions, development of psychosomatic manifestations (allergies, frequent diseases), formation of negative attitude to educational activity, appearance of neurotic reactions. Often, subject to appropriate social support, these assets can be translated into persistent personal traits, even if the child's educational achievements are quite high.

As you know, the nervous system of a child under 5 years is very weak, therefore, babies often shiver from strong noise, they can cry for no apparent reason, because it is a time of rapid uneven growth when bone tissue is rapidly increasing, and the nervous system tries to catch it. Assessment of neuropsychic development of the child is carried out through a comparison of her skills with control indicators. The main criteria for assessing the psychoemotional development of children from 3 to 6 years old are: development and speech activity (correct pronunciation of words, reading poetry), sensory development, activity in the game, constructive and visual activity, visual coordination (walking equilibrium, static equilibrium), cognitive activity, socio-cultural development (sanitary-hygienic skills, hard work, independence, etc.). It is clear that the development of any parameter needs to work, because nothing is taken anywhere. The child with whome one did not speak, did not actively work on the sound, replenishment of the vocabulary would never be able to show a high level of speech competence. Therefore, it is necessary to engage in development, but it is not necessary to artificially create a situation of inhibition due to the implementation of inadequate age and neurobiological possibilities of the body of didactic programs that for some reason are "masked" and called the programs of early development instead of training is not worth it.

It is precisely in the preschool age that the foundations of creative imagination, figurative thinking, the ability to own their emotions, social communication skills, and many others are laid. It is proved that all these types of activities are best realized precisely through gaming activities. The rigid time constraints associated with educational activities erase the arbitrariness of the development of all mental functions that ensure the overall development of the child, and thus the reverse process take place - delays, the stiffer and greater educational requirements for children, the more significant is the delay of the mental and emotional-volitional sphere [8]. A child can not effectively absorb knowledge until its nervous system is ready [9]. Violation of the logic sequence leads to complications of mental development of the child and health problems.

The child must have a large number of life skills, primarily related to self-service skills and the ability to live fully in the natural environment, communicate in society, and develop physically [10]. Today, there are many studies suggesting that learning to read in 4-5 years is easier than at a later age; to develop a vestibular apparatus is best at the age of 1, while simultaneously mastering several languages is most appropriate in preschool age (bilingual studies), a child of preschool age is more easily adapted to different social conditions [11]. But all this depends on the method of early learning and the way in which it is used.

One of the well-known methods of early education is the M. Montessori system, which is intended for the socialization of mentally retarded children. The main goal is to push a small person to the self-development. The curriculum is based on an individual approach to the child's personality from the moment of her birth. It is necessary to reveal the resources and intellectual potential of each child. Each child develops on an individual (personal) plan in a specially prepared environment. In the center there is a baby, around which one creates a special environment that involves self-study. The teacher only helps the children, not interfering especially in the natural course of development. According to the author's plan, rooms for classes should be divided into zones: space, mathematical, sensory, linguistic,

practical life. According to M. Montessori, nerve endings are concentrated on the fingertips, stimulating the speech centers located in the cerebral cortex. Reasonably retarded children engaged in this system not only learned how to speak, but also how to read, write and count earlier then their peers who were not engaged in this system. Therefore, it was assumed that such exercises are suitable for the training of all children.

Montessori groups are always heterogeneous and of different ages: in some classes there are children from 1 to 6 years old, in others - children from 7 to 12 years old. Such a division has certain advantages, since older children care about children, and the last ones, in turn, learn from more adult comrades. Among the disadvantages of this technique: the active development of the left hemisphere of the brain, while the development of the right hemisphere is inhibited, therefore, logical thinking, analytical abilities that are suitable for practical activity are developing rapidly enough, but suffer from creative abilities and the function of holistic perception of the world. Therefore, today there are notorious cases that creatively gifted children are difficult to perceive the system developed by M. Montessori. The gaming sphere is developed to a lesser extent, as there is almost no time for performing story-role games for children working on this technique, and as a consequence social and emotional development is not properly implemented. According to the researcher O. Smirnova, this technique restricts the imagination and speech interaction of children, therefore, for a child with blemishes it is quite suitable (in the conditions of at least partial correction), and for a child it is healthy to delay the development of imagination, fantasy and speech destructively, because the child's speech is one of the most striking indicators of mental development, the parameter according to which it is diagnosed [12]. In our opinion, the worst is the lack of work with the fairy tale and author's literary works that allow solving a large number of social and behavioral issues, teaching context-based perception. Such a technique is not suitable for hyperactive children, who are not able to regulate their emotions and behavior, and to concentrate on any one object. Very limited it can be used for children suffering from autism, because even more focus on something for one and deepening in itself during a considerable period of time for them is very harmful.

Another method of early education, which is actively used at the institutions of preschool education in Ukraine, of American scholar Glenn Doman.

Studying the peculiarities of the psyche and teaching children with brain damage, he established the following pattern: developing classes are effective only during the period of the greatest activity of the cerebral cortex, that is, at the age of 7. Therefore, the main task of parents - to maximize the enormous psychophysiological potential of the child. An American physician is convinced that the child's nervous system before it is one year old, is so unique and perfect that even at this age, the kid is able to learn and systematize various facts and information. It is better to start lessons at 2 years, and not later than at 6.

It is believed that up to seven and a half years the human brain has already been formed and develop it extremely difficult. So, by stimulating one of the organs of senses, it is possible to increase the activity of the brain as a whole. Therefore, children who were injured, but constantly engaged in reading gradually began to move. According to the researcher, children who were lagging behind in physical and mental development from healthy children, over a certain period of time, trained and outstripped them in physical development and well-being [12]. Among the benefits of this technique are: the intensification of child development (child curiosity should be supported by speed and novelty); learning is a game and it has to be stopped before the child is tired; active involvement of parents in communication and studies with children, because parents are the best teachers; expansion of children's opportunities by providing the child with a large informative flow; development of child's attention, because a child can rememberany word, seeing and hearing it 12-15 times. At the same time, one can distinguish a number of shortcomings: in the process of working a child is a virtually passive, the adult is much more active adult, that can cause a passive attitude to occupations; a huge amount of didactic material is needed that can simultaneously bother with the same type (a certain size, color of letters, style of design); there is no speech practice; little attention is paid to fine motor skills, sensory development and subject activity; G. Doman's cards do not develop the child's logical thinking, the ability to analyze the text and systematize the facts, the content of the text, the children do not learn to distinguish it from the main thing; the technique does not pay enough attention to creativity, gaming activity, because it lacks time; no communication with peers; possible overload of the child's nervous system due to too much information and strict discipline, as a result of which there are known cases of enuresis and other problems of children.

Dissatisfaction with the Glen Doman's system prompted the development of its own methodology of a Belgian researcher Sesil Lupan. The developed technique is a complex of occupations that take into account the child's individuality, interests and inclinations of each child. The author of the methodology in his books advises to communicate with the baby from the first seconds of his life, and do not need to worry that it will not understand something. S.Lupan is convinced that the earlier the child learns something, the faster he will understand certain regularities and connections. The child in the first months only gets used to the parent's language, and then, seemingly, meaningless sounds begin to be filled with content. As soon as he begins to pronounce the first words, one has to go to reading (usually one year old). The researcher recommends that each word should be written in capital letters and placed on objects that they mean. For example, the "table" will be at the table, and the "bed" - at the bedside. To be engaged in S. Lupan's method is possible from birth. The main idea proposed by the researcher is the following one: the child does not need attention-ward, he needs attention-interest, which can only be provided by loving parents. The benefits

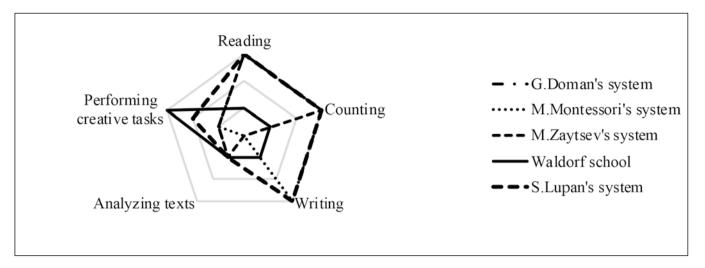


Fig. 2. Parameters of the cognitive sphere in early education systems

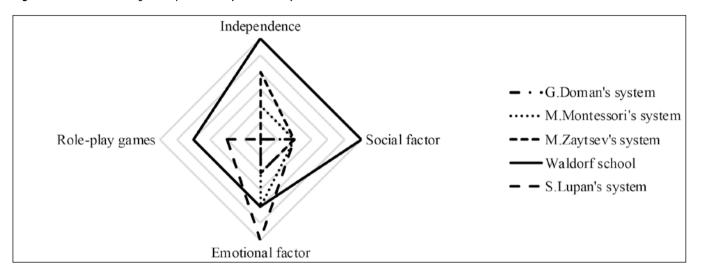


Fig. 3. Parameters of the non-cognitive sphere in the systems of early education

of the method are that much attention is paid to the early physical development of the baby; exercises develop the intellectual and emotional sphere, the sensor of the child and provide for very close communication with the mother; the method is based on stimulation of cognitive activity of the child. The disadvantages of the above-mentioned methodology are the lack of a systematic approach, a significant temporal sacrifice on the part of parents, a kind of swimming training for infants [13].

The next popular method of early development (education) that is actively used in Ukrainian preschool institutions is the methodology of Russian teacher M. Zaytsev, who has developed special cubes for spelling. When playing with such cubes the child gradually begins to spell and read. Carefully watching his little pupils, the researcher came to the conclusion that most children learn the information visually, the rest through hearing or touching. This discovery has become a stimulus for creating interesting educational materials in the form of cubes that affect various analyzers of the child. This technique is unique in that due to its application, one can learn to read a 2-year-old child for six

months, and a 5-year-old for two weeks. Cubes are divided by color, size, sound (filler), the material of which it is made. The advantages of this technique are rapid learning of the recognition of syllables and reading, the expansion of vocabulary, logic in construction, speech correction. But there are also disadvantages: during prolonged occupations the color, size, conditional notation of sounds are remembered, and in the system of school education they do not correspond to the existing marks; therefore, teachers need to reeducate children, which is given very difficult; the sequence of education is absent. Children who have passed such an education method is difficult to reorient to the methodology of school education [14].

An important issue is the definition of tools for measuring the indicators of mental development of the child. A thorough review of this is the development of the Institute for the Modernization of Educational Content: a qualimetric model, which allows obtaining separate and consolidated data on the development of the child, according to the different competences described in the Basic Component of Preschool Education in Ukraine.

Such a model provides an opportunity to diagnose the achievements and lag of each child at the time of joining the school, improve the educational process, ensure continuity between pre-school and primary education, assess the leadership of the institution of preschool education, and most importantly - allow teachers and parents to correct the educational impacts that are carried out on the child, to continue the individual trajectory of development on which we try to lead the child during the preschool age, etc. Among the factors (a factor affecting the assessment of the development of the child) that are considered in the qualitative model: physical development and health of the child, social development, natural-ecological, aesthetic, subject-practical and game activity, sensory-cognitive, speech, - they are the educational lines indicated in the Basic component of pre-school education. This approach allows to balance the development and support of the child's health [15].

Summarizing, in the systems of early education of M. Montessori, M. Zaytsev, G. Doman, Waldorf School, S. Lupan we distinguish the most representative parameters of the cognitive sphere - the ability to read, write, analyze the text, calculate, and perform creative tasks; non-cognitive sphere: emotional, social factors, autonomy, ability to play role-games, as a factor in the preservation and enrichment of health. By placing conditional indicators on a scale from 1 to 4 points, we will define to what extent the attention is paid to the specified parameters according to the systems of early education: 4 points - the system of early education is entirely aimed at the formation of skills; 3 points - the system of early education is more focused on the formation of skills; 2 points - the system of early education is insufficiently aimed at the formation of skills; 1 point - in the system of early education there is no focus on the formation of skills.

We obtain results in the form of a petal diagram on cognitive (fig. 2) and non-cognitive spheres in early education systems (fig. 3).

According to the diagram of cognitive sphere we can clearly trace that in the examined earliereducation systems there is no perfect balance between all the components. Therefore, the early education M.Montessori, M.Zaytseva, H.Domana and S.Lupan systems place greater focus on the acquisition of skills (read, write, count), while Priority Waldorf School is to acquire creative skills. [16] Annoying is extremely important that the cognitive ability to analyze text (which is part of the formation of imagination and fantasy) none of the systems does not pay attention, that is an incorrigible disadvantage.

In the non-magnetic sphere, we draw attention to the fact that the early education systems of M. Montessori, M. Zaytsev, G. Doman, S. Lupan devote little attention to social and emotional factors, the ability to play role-plays, autonomy, while the Waldorf School system is more harmonious, healthy saving, aimed at satisfying the behavioral needs that are formed in this age period.

Considering the psychodydactic peculiarities of the development of preschool children by the methods of individual researchers, we consider it necessary to analyze the system of pre-school education in some countries. The most indicative of this statement is the study of Perry's program: an early impact on the development of children growing in a disadvantaged environment. The results of panel data collected, mostly of the United States, show: the quality of the conditions of development in preschool allows a high probability to predict the future efficiency of workers. Therefore, researchers Eric Knudsen and Judy Cameron, Jack Shonkoff, together with James Heckman, in the article «Economic, neurobiological, and behavioral perspectives on building America's future worcforce» have shown the dependence of the return on investment in human capital as the function of the age in which the investment is first performed, which is reflected as «Hecmar's Curve». By examining the issue of early education, we drew attention to the systems of pre-school education in different countries today, trying to find out whether there is a demand for early education systems by the state.

So the Finnish education system aims to provide a sufficiently high level of academic achievement and awareness of the entire population. Preschool education is education a year before children begin to attend general education. The goal is to enhance the child's ability to learn. Teaching in pre-school education is based on gambling activity, which takes place in accordance with the level of development of each child, which also stimulates the linguistic abilities of children, their motivation for learning new ones. The activity is based on children's needs through game and imagination. The advantages of Finnish education: individual approach to each student, self-education and voluntary, no rush, equality between pupils, parents, schools. The Finnish Education Directorate does not classify children as strong and weak, healthy and sick, allowing them to study in one class [17].

Somehow different is the attitude toward early education in Israel. Kindergartens there are state-owned, children are taken from an early age. Public and private kindergartens are controlled by the Ministry of Education. All children must attend an older group in a kindergarten where free schooling is provided. They master various types of artistic activities, listen to stories, tales, learn to read and count, work with computers, get acquainted with folk traditions. In kindergarten tutors prefer game education. In 4 - 5 years, children learn to count, read and write, arithmetic, seek to develop creative thinking in children and, using game programs, familiarize themselves with the basics of computer literacy. During the day, children are entertained, they are developing their games, do different thingstogether with them, conduct sports and music classes, read books, tell about traditions. They are busy preparing for school: they teach writing, reading and counting. The only compulsory group in children's preschool education in Israel is a group of 5 to 6-year-old children who are preparing for school. Before the first class, the child will not go if he can not read and did not go to the preparatory group. The education system is based on the outline of the solution allowed in conjunction with the creation of a warm and

friendly atmosphere for the development of such qualities as independence, responsibility, consistency, respect for people, and the ability to listen. Particular attention is paid to the formation of life skills: the ability to withstand difficulties and find solutions from various life situations [18].

There is no concept of "punishment" in Israeli preschool education. Controversial situations are thoroughly analyzed and discussed with children in order to achieve mutual understanding, as well as mastering the necessary communicative skills for entering the school. Children are accepted from the age of six. Thus, early learning techniques based on the psycho-physiological characteristics of the child are actively transformed by Israeli educators into early-stage methods that do not deprive the child of the right to free choice and are carried out with the help of a leading type of preschooler-game activity.

Let's consider the attitude to the methods of early education in India, where children go to school from 3 to 4 years old, study 6 days a week for 6 - 8 lessons per day, duration of the lesson - 35 minutes. There are no kindergartens in the country, but there are «preparatory groups» that are divided into four directions according to age. The first «play group» is visited by two-year-olds. Since there are no classes other than the game, so it's not necessary to attend such a group. The second group - «nursery group» and visiting it is already obligatory. In this group, children are beginning to study. The third group is the «lower kindergarten». There are five-year-olds who already know the English alphabet, some Hindi letters can count up to 100. The fourth group is the «upper kíndergarten». After this, the child can easily enter school because he already knows the Hindi alphabet, can write a few words in English and can make simple mathematical calculations with numbers up to one hundred. India has the largest school in the world, with 32,000 students. This is a school run by the M. Montessori system, which demonstrates the benefits of the local population to this system. Thus, in the preschool education system of India, attention is focused on the early childhood education [19].

#### CONCLUSIONS

The analysis of various methods and ways of solving the problem of the development of children of preschool age outlined many contradictions and the need for further inquiries into this problem. After all, early education is not just a preparation for school education, but also the creation of conditions for the harmonious and comprehensive development of a child of preschool age, training of memory, imagination, attention, development of logical thinking, processes of analysis and synthesis, which is proved by many scientific researches. The child's brain is a very flexible structure with a powerful reserve, which allows you to compensate for defects and does not stop development throughout your life, opening up great opportunities for correlation and therapeutic influence of a favorable environment. Therefore, neuropsychologists, representatives of classical psychology, educators, sociologists,

economists pay much attention to the dynamics of child development, since it depends on the psychological and general development of the adult person and the development of society as a whole, both intellectual and economic.

The need of early education systems for the general public of children that were created as corrective is a controversial issue; at the same time, the need to develop harmonious early development systems is indisputable. Using the method of quotient-criterion modeling of the spheres of mental development of the child, we came to the conclusion that among the systems of early education that we have examined there is no perfect balance between the components of both cognitive and non-cognitive spheres, which affects the psychological, physiological development of preschool children, accordingly, preschool education systems require more a thorough correlation, and hence the development of a more balanced technology that pays special attention to the sensitivist activity of the child and provided health-preserving educational function, not forgetting about the intellectual sphere.

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#### **Authors' contributions:**

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