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Difficulties of Inclusive Education in Preschool: Neurophysiological Features

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Abstract: *This article focuses on the current concerns of educating children with special needs in an inclusive setting. It delineates the fundamental contrasts between integration and inclusion, portraying the challenges of the transition period and the possibilities for further progress of inclusive education. Consequently, the aim is to determine the neurophysiological features of personality development in the process of inclusive education in preschool institution. Changing approaches to teaching and education of children is aimed at the formation and development of socially active personality with skills of socially adaptive behaviour of mobile economy. The content of the key concepts of the study is defined. One of the ways to achieve this purpose is inclusive education. Theoretical and methodological foundations have been formed on the basis of scientific research on this issue. The methods of synthesis, analysis, exploratory, scientific, explanatory and descriptive methods were used for effective research. The results do not exhaust all possible aspects, but represent a significant contribution to the study of neurophysiological features of personality development in inclusive education.*

Keywords: *humanisation of education; inclusion; actual problems and difficulties of inclusive education; neurophysiological features of the child; resource provision of inclusive education.*

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1. Introduction

Inclusion is a process by which something is included, attracted, and accepted as part of a whole.

Many developed countries are involved in this process. Inclusive education is a logical continuation of the ideas of integrative education, which chronologically, ideologically, and technologically preceded inclusion.

Inclusion and integration are two different principles that determine the level of involvement of children with special needs in the education system. Integration returns such students to the general education system, since until this stage, children of this category studied only in the system of special (correctional) education. However, while in the general education system, students with special needs must fully master the general education program. Inclusive education is not a form, but a new education with its philosophy, education of opportunities, and free choice. Inclusive education emphasises adapting the learning experience to the individual, creating a unique educational program (Vdovych & Palka, 2013). With inclusion, all participants in the educational process change their attitudes towards children with special needs. Therefore, integration can be considered an educational technology, and inclusion is socio-cultural.

The current stage of development of inclusive education is filled with many contradictions and problems and requires educators to have a professional and open dialogue and coordination of positions. In the strategy for inclusive education development, the current period is defined as transitional.

Despite the readiness of the educational institution for changes, inclusive education development practices require systemic institutional changes that do not occur quickly. At the same time, the most difficult of them are changes in professional thinking and people's consciousness, starting from the psychology of the teacher and ending with the economic and financial basis of the functioning of the entire system.

Over the past decade, there has been a progressive deterioration in children's health. There is an increase in manifestations of aggression, substance abuse, and other forms of delinquent behaviour, and a sharp decrease in their age threshold. Most children have delays and distortions in psycholinguistic development, underdeveloped self-regulation skills, dysgraphia, and various psychopathological symptoms, such as increased excitability and exhaustion. In addition, they may demonstrate somatic and psychosomatic vulnerability, including problems with blood vessels and the musculoskeletal system, weakened immunity, and desynchronosis (Lazurenko, 2015).

Taken together, this leads to emotional and personal cognitive unreadiness for learning and adequate adaptation in society. To form an innovative model of complex phased rehabilitation of students with these disorders, research work was conducted to determine the features of inclusive education.

The purpose of the article is to study substantiated technologies for the socialisation of the student's personality, capable of independent adaptation, integration, and self-realisation in society in the conditions of inclusive education and within their neurophysical capabilities.

2. Theoretical and Methodological Features of Inclusive Education Research

Inclusion in education is closely related to the processes of inclusion in society. An inclusive approach is currently nothing more than a social order of society and the state, which have reached a certain level of economic, cultural, and legal development, where, based on the principles of humanism and tolerance, there is a rethinking of the attitude towards diverse population groups with the recognition not only of the equality of their rights but also of the awareness of the obligation to provide them with equal opportunities with all other people, including in obtaining education. The belief that education is one of the most important human rights and allows for the formation of a just society, formed the basis for the formation of the concept of "inclusive education". Therefore, all children have equal rights to education, and this cannot depend on their problems or personal qualities. Inclusive education is a term that allows us to describe the process of educating children

with disabilities in general education organisations. Inclusive education is based on an ideology that excludes any discrimination against children, ensures equal treatment of all people, and creates special conditions for children with special educational needs. We are talking about children with special developmental needs and disabilities. Inclusive education and training involves supporting not only boarding and special schools but also all other educational organisations. After studying in special institutions, especially successful children can begin studying in general education schools, where a place will be provided for children who were previously considered difficult and unlearnable. The modern education system is focused, first of all, on students who meet certain requirements and are able to study according to a common program for all. As a result, children with disabilities do not have the opportunity and conditions to participate in the general educational process. It is inclusive education that will help solve this problem. After all, the problem of educating children with disabilities is one of the most urgent in modern society.

Inclusive education is an important component of the educational process in modern social development. An educational institution implements educational, training, and developmental functions. The specificity of these functions is the correction, compensation, and rehabilitation of the children's personalities. One of the directions of inclusive education is the determination of the neurophysiological characteristics of the child.

The purpose of the neurophysiological examination of children using the EEG method was to assess the state of brain activity and determine the areas of the cortex that respond to the action of stress factors. An examination was conducted with children who were selected using the "Snowball" method. For this purpose, the standard international potential distribution system "10-20" was used, proposed by the International Federation of Electroencephalography and Clinical Neurophysiology. Further data processing included a special set of computer programs, which allowed observing the dynamics of the distribution of power and frequency (spectral characteristics) of rhythms on the surface of the cerebral cortex. Using coherent data analysis, the number of functional connections between individual areas of the cortex was revealed. Special attention was paid to interhemispheric interactions as correlates of memory processes, learning ability, concentration of attention, etc. Statistical programs allowed us to assess the reliability of the collected changes, which is an important factor in comparing the functional state of the brain before and after treatment. The scheme considered the age-related features of the brain's development in children.

The software and hardware complex "Pulse-antistress" was used to assess nonspecific adaptive reactions of the body. The method takes into account heart rate and respiratory rate indicators, combined into a screening index - tension index (IN) of regulatory systems, which characterises the activity of sympathetic regulation mechanisms, the state of the central regulatory circuit and is calculated based on the analysis of the distribution graph of cardio intervals - variation pulsogram. Emotional or physical overload increases the IN by 1.5-2 times (the norm is up to 100 conventional units).

Neuroenergetic mapping (NEM) is a relatively new electrophysiological method based on measuring the level of standing potentials (SPP), which reflects the state of the acid-base balance (ABL) at the border of the blood-brain barrier.

The level of the brain's standing potential is a type of slow electrical processes that integrally reflect the membrane potentials of neurons.

AMP registration was performed in five leads: frontal, central, occipital, and two temporals on the right and left, according to the 10-20 scheme. The projections of the AMP registration zones correspond to the main vascular systems: anterior cerebral (two), middle cerebral (two), and vertebrobasilar fossa.

3. Effective Factors of Inclusive Pedagogy in Preschools

It is well known that a child's success determines their ability to engage in the learning process − developing skills of communication with others, having a good base of knowledge and understanding of the world, and having basic literacy and numeracy abilities, cognitive ability, and a curiosity for learning. A preschool child must have the necessary base: physical health, perseverance, a sufficient level of development of mental functions, and emotional and volitional maturity. Children with special needs do not have the same foundation (Grisham-Brown, 2009).

The clinical picture was dominated by neurovegetative symptoms of maladaptation: headaches, stress, meteorological dependence, unstable attention, increased exhaustion, psycho-linguistic disorders, and sleep disorders. Neuropsychological research has revealed a number of peculiarities in the cognitive, personal, emotional-volitional sphere and behaviour of children: unformed emotions, poor vocabulary, insufficient verbal and logical operations in the thinking process, difficulty in sound analysis, unformed skills of mental activity and self-control, slowdown of perception processes, unstable attention, weakened memory, and serious speech disorders.

The introduction of inclusion has difficulties in organising. It is, first of all, the creation of a "barrier-free environment".

There are social problems. They include: a) widespread stereotypes and prejudices; b) readiness or unwillingness of teachers, students, and their families to adopt new educational principles; c) insufficient understanding of the psychological and pedagogical aspects of inclusive education, as well as the lack of technological resources and research on the subject (Bass, 2019).

For the successful implementation of inclusive education, rigorous research is required to gain insights into the underlying processes and outcomes of the qualitative transformation and influence the common perception of the possibility and efficiency of inclusion in education.

The existing professional training for general education teachers and support specialists is inadequate for implementing an inclusive approach. Specialists in corrective pedagogy and special and pedagogical psychology need to provide these teachers with comprehensive aid to grasp and employ strategies to personalise the education of children with special educational needs. It is essential for preschool teachers to recognise that every child is unique and to adjust their teaching strategies accordingly (Bass, 2009).

The main question of practitioners − "How to do it?" will not yet find a qualified answer in all cases. In Ukraine's educational system, two sources of content can be drawn upon in order to foster an inclusive approach to learning: the knowledge gained from special and integrated education, as well as the technological resources in psychological and pedagogical support for those involved in the educational process. Communication between teachers of different educational systems, on a professional level, can have a positive impact on mutual enrichment and the growth of opportunities for cooperative learning and teaching. (Maksymchuk et al., 2018).

It is necessary to change the position of parents. Parents' independent thinking determines the educational trajectory of a child with special needs, parents' partnership position in relation to the school, and their responsibility for the educational result. The father should become a partner, but is still deprived of the right to make a responsible choice. Recommendations of specialists become a "verdict", and consultation does not open opportunities and options for behaviour. In the process of development of inclusive approach in education, the position of parents will become more and more independent and active. Establishing and maintaining a fruitful conversation with parents is an essential task of the school society in order to involve them in participation, cooperation, and collective discussion of the child's learning atmosphere (Bass, 2008).

At the same time, one of the main tasks is to create a sustainable developing effectively functioning system of psycho-pedagogical support of inclusive education in different types of institutions on the basis of existing experience in the field of education of children with special needs. To ensure stable perspective development of the school, it is necessary to purposefully create an organisational and educational system capable of integrating and clearly directing the teaching

staff's professional efforts and creative potential. The school's organisational and educational framework encompasses its structural design, management mechanisms, pedagogical setting, educational material, educational procedure, and individuals involved in the educational activity.

In their work, managers note the following challenges and obstacles:

- Already existing institutions cannot cope with the population's growing demand and risk "leaning" towards a correctional educational institution.
- Lack of equipment for legal support of the educational process, including during the transition from system to system.
- The educational system's high academic requirements make it very difficult to adapt the secondary school curriculum to the needs of a child with special needs. This also hinders the introduction of foreign experience. For example, basic education in England is more focused on practical knowledge of the world, here the status of professional preparation for college is high, which simplifies the task of inclusion.
- Development of inclusion in an ordinary school.
- Insufficient assistance from higher educational institutions to teachers working with children with special needs in mainstream schools.
- Underutilisation of the potential of correctional school specialists. An established interaction between specialists in general education and educational institutions would facilitate a better understanding of the problems of children's deviant behaviour.
- The parental movement is underdeveloped.

The main directions of resource support for the development of inclusive education should be:

- Creation of a training system for the pedagogical and parental community, other children to perceive children with special needs, the formation of tolerance (courses of positive partnership, a system of training for teachers).
- Organisation of training and retraining of professionals to work in the conditions of inclusive education.
- Development of blocks of educational programs of preschool educational institutions at the stages of primary and high school. The number of different levels of complexity of educational programs should be not less than 5-7, as it is provided by the system of integrated education abroad.
- Creation of a system of objective assessment of the level of knowledge, skills, improvement, and development of a child in accordance with different levels of complexity of program material.
- Development of differentiated programs on the tasks of profile education and development of labor skills of high school students in accordance with their intellectual and physical capabilities.

For the development of inclusive education today, it is important not only to solve organisational, methodological, and logistical issues but also to prepare teachers, students, and parents themselves for joint learning with different abilities.

Achieving a complete level of inclusive education in higher education is a vital factor in the progress of the future society (Blakemore, Frith, & Chic, 2007). Formation of an inclusive culture, first of all, pursues the goal of full socialisation and integration of persons with special needs into society.

One of the main directions of inclusion realisation is the formation of an inclusive culture for all participants in the educational process. Inclusion is a long-term strategy, which is not a local direction of work but an interdisciplinary approach to the organisation of the educational system in all spheres as a whole. Inclusion concerns all subjects of the educational process, i.e., persons with special needs, their parents, conventionally normal students and their families, teachers, and other specialists of the educational space, administration, and structures of additional education.

4. Neurophysiological Factors of Personality Development in an Inclusive Preschool

Neurological and manual-therapeutic examination of these children in 95% of cases reveals a pronounced posture disorder and hypertonus of the muscles of the upper shoulder girdle with impaired spatial representations and reciprocal coordination, as well as respiratory diaphragm spasm in combination with various types of posture disorders.

The main biomechanical changes in the examined children were: myofascial and muscle-tonic syndromes of the cervicothoracic spine and shoulder girdle, elevation of upper thoracic structures, multilevel "tunnel" disorders, and various pelvic dysfunctions, which led to a decrease in adaptive capabilities.

The pulsogram data show that over 88% of the studied children had tension index levels higher than 100 units, which was indicative of a decrease in adaptive capabilities, thereby confirming the existence of both muscular and informational tension in them (Nychkalo, 2008).

Neuroenergy mapping studies reveal three distinct groups of children in regard to their baseline performance when compared to the average for their age (Banerjee, 2019):

- The group with low background AMR value − 12.5%.
- Group with normal AMP − 47%.
- Group with increased AMR − 40.5%.

At UVK, numerical indicators of the ASR condition are converted into colours. Movements toward acidosis (decreased pH and increased ALR) are presented in yellow-red-brown.

The more the brain uses the reserve energy exchange mechanism, the redder it is colored in the picture, and the higher the SCP (the brain is "on fire", the brain is overexcited).

The transition of ASC towards alkalosis (resulting in an increase in pH and a decrease in ALR) is represented by blue hues on the NMS image. When the reserve pathway of energy exchange is underutilised (leading to decreased ALR) and there is reduced functional activity in a specific region of the brain, that particular area takes on a blue tint (Cárdenas Gómez, 2021).

The NMS marks normal levels and types of neurometabolism with a green color. The device calculates the normal values based on the age, gender, and dominant hemisphere of the subject (Castillo, 2015).

A reference metabolic map of the brain is situated close to the subject's brain map on the NMS. This research method is beneficial as it displays the dynamic functional state of the brain (Cumpa Valencia, 2019).

The neurophysiological study's results of EEG showed the presence of individual features such as deviations from the age norm and persistent pathologic manifestations. In the group of examined children of the II age period, the following deviations from normal EEG parameters were observed: zonal differences were smoothed, and alpha rhythm was either unexpressed or excessively high amplitude (up to 180-200 μV). At the same time, there was an irregular high-amplitude alpha rhythm in occipital-parietal regions, alternating with irregular slow waves of delta range (0.5...3 oscillations/s), periodically formed paroxysms of slow waves with amplitude up to 200-300 μV, with a tendency to diffuse and spread over the entire brain surface. A topographic emphasis of the slow-wave activity generation in the occipital and parietal parts of the brain is usually observed in blood circulation disorders in the basins of vertebral and basilar arteries. In turn, these disturbances were usually the result of muscle-tonic tunnel syndromes of the cervical and upper thoracic segments. The irregularity and asymmetry of peripheral processes can also be reflected in the interhemispheric asymmetry of activity indices of separate zones. In these cases, interhemispheric asymmetry in the parieto-occipital regions is most characteristic.

Similar changes were observed in children of the first age period. In the presence of persistent pathologic influences originating at the spine's level, the formation of foci of pathologic activity was observed in the brain. They were expressed in the parieto-occipital area (in 68% of cases) and were accompanied by asymmetry of the power of rhythms in different frequency ranges. Paroxysms of slow delta-band oscillations became more stable, which made it difficult to identify the focus of their occurrence, as secondary multiple foci were created with the involvement of

temporal cortical areas. In these children, the response to hyperventilation was marked by the emergence of peak-slow wave complexes, with a concurrent increase in the magnitude and intensity of all types of oscillations (Rudenko, 2015).

It can be assumed that one of the variants of the pathological process development in the brain, the cause of which could be a “tunnel” muscle-tonic syndrome of natal or postnatal origin, was manifested here.

These studies already show the importance of careful examination and treatment of EEG in children at a very early age. Given that interhemispheric balance is established in children during the third and fourth age periods, monitoring of interhemispheric functional connectivity is necessary. As of now, psychological and neurophysiological methods are available to cultivate them (Kaiser, 1974).

Nevertheless, within this group of children, the interhemispheric connections are notably underdeveloped, particularly in the higher frequency bands of alpha, beta, and gamma rhythms, which are the most indicative of the efficiency of psychological functions (Archibald, 2015).

Neuroenergy mapping recorded at all ages allowed us to determine the state of brain energy activity, baseline metabolic rates, and especially the reserve brain energy metabolism, which correlated with the state of acid-base balance (ABR) and constant potentials (CPP). In the process of SCP measurement, the status of the ASR was monitored in multiple brain regions (Béjar, 2014).

Inclusion today, being at the formation stage, puts forward high requirements to all subjects of the educational process. It requires intellectual and psychological training from students with special educational needs, from conditionally healthy students − tolerance, humanity, understanding, and readiness to help.

5. Conclusion

Consequently, the difficulties of inclusive education’s implementation are related, on the one hand, to the lack of training (psychological, informational) of participants in the educational process, and on the other hand, to the imperfection of external conditions of the educational process.

The formation of an inclusive culture in the educational institution is considered by researchers and practitioners as a goal, the solution of which lies at the heart of inclusion and includes the assertion of values of respect for diversity, tolerance of differences, cooperation, and encouragement of everyone’s achievements. and the creation of an inclusive society on their basis.

Previous results have shown there is a need for an evidence-based integrated systematic approach to the development of rehabilitation programs with inclusive education, which will allow children with special needs to adapt to society. The gradual socialisation of children requires joint activities of doctors, psychologists, and educators to develop criteria for the culture of their safe behaviour in society.

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