

Formation of Correctional Competence of Teachers on the Basis of Neuropedagogy

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Abstract: *Since any psychological and pedagogical correction involves the modification or creation of neural connections for a new model of thinking and behavior, such activities of the teacher is impossible without taking into account the data of neuropsychology and neuropedagogy. The purpose of the study is to develop and theoretically substantiate the method of formation of correctional and pedagogical competence of primary school teachers in the process of professional retraining on the basis of a neuropedagogical approach. The study involved 142 respondents - primary school teachers (70 testing group and 72 experimental group). For effective formation of correctional and pedagogical competence of teachers on the basis of neuropedagogy in the process of professional retraining used technologies of contextual learning A. Verbytsky (2006), which allowed to form a holistic structure of professional activity of teachers by optimal combination of reproductive and active methods and reproduction of neurosocial context of pedagogical activity. The number of teachers with a high level of formation of the cognitive component increased by 53.7%, motivational - 52%, reflective - 50.7%, operational - 49.2%. The necessity of applying contextual teaching technology has been proved, which allows creating an integrated structure of professional activity of primary school teachers by using the optimal combination of reproductive and active teaching methods and reproducing the neurosocial context of professional activity using the content potential of pedagogical disciplines for positive motivation for the implementation of inclusive education.*

Keywords: *indicators of correctional competence, neuropedagogy, lateral profile, neurosocial context, professional competence, neurophysiological features.*

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Introduction

Global trend in the field of social policy of the late XX century is characterized by the introduction of integration into special education and the fight against various manifestations of segregation. In the theory of correctional pedagogy, this was embodied in the development of conceptual provisions that contribute to the creation of conditions for equality in the development of children with special needs of psychophysical development of different levels of educational standard. The concept of "school for all" was introduced in the Salamanca Declaration, adopted in 1994 by 92 countries, including Ukraine. This document identifies the priority of educational policy as the need to create an approach that maximally provides conditions for the education of children in institutions with inclusive education. However, the problem in the full embodiment of inclusion remains the neuropsychological difference of children with special needs, such as neurotic, psychopathic or autistic accentuations of the nervous system, clear homolateral accentuation of the brain, low or high neuroreactivity, and so on. Teachers of ordinary secondary schools often lack the necessary knowledge of neuroscience, nor sufficient neuropedagogical tools, which makes research to improve neuropedagogical competencies relevant.

The main problematic aspects of neuropedagogical, neuropsychological and neurophysiological correction of children with mental disorders are given below. Thus, an individual neurophysiological characteristic of people with cognitive, emotional or other mental disorders is the inability to adequately respond to a rapidly changing situation, as well as to make environmental decisions. At the same time, it is much easier to determine the mechanisms of such processes in pathology for neurophysiologists. First, modern equipment allows one to determine typical zones of excitation under recurrent (repetitive) deviant or, at least, non-standard behavior. Particularly relevant patients are those who are capable of adequate reactions and behaviour "in the light intervals" of the underlying disease (Beszterczey et al., 2013). This provides promising prospects at least for diagnostics.

Another correctively valid aspect is risky behaviour (including sexual) since its neurophysiological mechanisms allow one to understand milder forms of deviations (dependent, compulsive, hyperactive behavior) (Ross et al., 2016). Teachers with basic neuropsychological skills can indirectly determine the predisposition to such behaviour and decide on the appropriateness of pedagogical or psychiatric correction.

However, the main problem of neurophysiology in its application to humans is ethical. By the end of the 20th century, serious neurophysiological studies had been performed only on animals. Modern humanization of society and all spheres of its consciousness (including medicine and correctional pedagogy) does not allow one to radically interfere in the course of brain processes. This is especially true for people whose psyche is within the norm or on the borderline psychiatric framework (small psychiatry). Radical psycho-correction and neurophysiological intervention are applicable only clinical cases (Bush, 2015).

Although, it is still essential to consider the research problem in the context of pedagogy. In modern world educational practice, special educational institutions and institutions with an inclusive form of education function simultaneously (Bondar et al., 2012; Chebotaryova, 2007; Gerasymova et al., 2019; Kolupayeva, 2009; Maksymchuk et al., 2020; Malofeev, 1996; Melnyk et al., 2019; Nechyporenko, 2013; Nerubasska, & Maksymchuk, 2020; Onishchuk et al., 2020; Sheremet, 1997; Sheremet et al., 2019). In Ukraine until the mid-90's of XX century the education of children with special needs was carried out mainly in boarding schools, which led to the social isolation of these children and the removal of parents from their upbringing. As a result, graduates of educational institutions experienced difficulties in integration into society. At the same time, some children with mental and physical disabilities had the opportunity to study in secondary schools, which contributed to the development of alternative educational institutions (equalization classes, training and rehabilitation centers, etc.) together with peers who develop normally, the process of their integration and inclusion. On the other hand, this period (90's) coincided with the so-called "decade of the brain", which was proclaimed by US scientists, who introduced the widespread practice of studying psychological, mental and psychophysiological problems in the neuroscience. This practice has been especially fruitful in the field of working with people with special needs. In this area (correctional pedagogy and special education) there are two areas - cognitive and affective, which is associated with right- or left-lateral accentuation in the brain. Different aspects of the problem under study are covered in the works of many scholars (Gerasymova et al., 2019; Nerubasska, & Maksymchuk, 2020; Melnyk et al., 2019; Sheremet et al., 2019).

The introduction of the concept of inclusive education in secondary schools of Ukraine at the beginning of the XXI century largely depends on the professional skills of teachers, which requires changes in the process of retraining and advanced training. In this regard, the problem of formation of

correctional and pedagogical activity of a teacher taking into account the neuropedagogical component of professional competence becomes especially important (Bystrup et al., 2018).

Most publications of recent years (Bobienko, 2005; Nechyporenko, 2013; Nikitina, 2005) reveal the content and structure of key competencies or competencies. Despite the fact that the study of professional competence and key competencies of specialists in the psychological and pedagogical literature is given much attention, the problem of formation of correctional and pedagogical competence of primary school teachers has not been studied. Instead, in the Western tradition of training for inclusive work and in the methods of coaching, social support and correction, the term "pedagogy" is irrelevant. Psychological sciences, in particular neuropsychology, are widespread there (Voigt, 2019). Data from neurophysiology and neurobiology are sporadically used in secondary schools. For example, in the form of a neuropedagogical experiment in Polish schools about 10 years ago, equipment for biologically feedback therapy was installed, which brought positive results in terms of psychocorrection (Studzińska, 2012). However, such systems require, firstly, significant financial investments, and secondly, non-pedagogical neurospecialists. So far, the most accessible form of application of neuroscience in the correctional and rehabilitation work of secondary school is the retraining of existing teachers in the direction of modern achievements of neuropedagogy.

The purpose of the study is to develop and theoretically substantiate the method of formation of correctional and pedagogical competence of primary school teachers in the process of professional retraining.

Material and methods

The following methods were used to diagnose the initial state of correctional and pedagogical activity of teachers: testing, questionnaires, interviews, analysis of lessons, author's pedagogical developments, solving pedagogical problems and situations, test and creative tasks, which made it possible to determine the main priorities classes with an inclusive form of education, installation and correctional orientation of the educational process. Modern scholars have proven the subjectivity of all participants in the educational process, as well as the fact that the neuroscientific approach involves methods and terminological systems and non-pedagogical areas (expansion and interdisciplinary, mostly psychologically and physiologically

oriented terminology) (Della Sala, & Anderson, 2012). Therefore, during the experiment, special attention was paid to identifying neuropsychologically relevant characteristics of the teacher - his motivation, activity, independence, creativity and purposefulness in the activities of the teacher.

During the ascertaining stage of the research, a survey of primary school teachers was conducted in order to identify the most important professional skills and competencies needed by a modern specialist. Among the selected indicators were the development of key competencies: professional development, mastery of new educational technologies, ability to work with a variety of information, study and summarize their experience and the experience of other colleagues, work in a team, avoid conflicts, communicate with different people and etc.

311 primary school teachers took part in the survey, of which 127 were primary school teachers with up to 5 years of work experience and 184 were primary school teachers with more than 5 years of work experience from different regions of Ukraine.

Using the author's diagnostic methods, monitoring was organized using criteria to identify the level of formation of individual components of the correctional and pedagogical competence of a teacher in a system of continuing professional education.

In the structure of correctional and pedagogical competence were identified general pedagogical components (motivational and operational) and neuropedagogical (cognitive and reflexive). Since both in the mind of the individual and in pedagogical practice, these components, as well as the corresponding mental mechanisms, act simultaneously, when collecting experimental data, general pedagogical and non-pedagogical indicators and criteria were not separated and recorded in the complex.

Thus, the criteria of neuropedagogical aspects of teacher competencies determine: the amount and completeness of theoretical and methodological knowledge on the problems of correctional and developmental learning of children with psychophysical disorders (cognitive component); perception and evaluation of one's own actions, exercising control over one's professional development, adequate assessment of students' judgments, ability to self-realize, self-develop in correctional and pedagogical activity (reflexive component). The criteria of general pedagogical aspects are the motivational component - awareness of the value and significance of innovative educational technologies and the need for their implementation in the context of joint education of children of different categories and operational - mastery of the basic methods of organizing the educational process on the basis of differential diagnostic,

prognostic and educational-correctional tasks, their rational application in the process of joint learning of students with different cognitive abilities to improve correctional and pedagogical activities.

Based on the analysis of research results and the experience of teaching children in inclusive classes, three levels of formation of neuropedagogical aspects of correctional and pedagogical competence are identified - high, medium and low. **The high level** includes teachers who clearly understand the importance of integration of children with special needs; recognize the right to choose an educational institution and form of education; define integrated and (or) inclusive education as an effective means of their socialization; have complete, deep and systematic knowledge necessary to work in new conditions; have neuropsychological diagnostic tools to determine the characteristics of development and behavior of children (left-hand / right-hand orientation of the brain, the individual nature and stability of foci of neural excitation, etc.); take these data into account in practice; critically evaluate and effectively use scientific and pedagogical literature for correction; use the necessary methods, techniques and means of child development to solve correctional problems. **The middle level** includes specialists with theoretical and practical competencies in neurosociology, namely: recognize their right to choose the educational route; identify integrated and (or) inclusive education as the most appropriate and effective means for children's socialization; generally use correct, but insufficiently systematized knowledge in working with different categories of children; are aware of the lack of knowledge, skills and abilities, see their shortcomings in the work, but are not always able to independently find a way to solve specific correctional problems that model professional activities in an integrated and (or) inclusive learning. **The low level** includes teachers who are not sensitive to non-integrative markers manifested by children in general education; low-sensitivity to their learning; insufficiently actively and independently replenish knowledge of neuropedagogy and acquire skills and abilities to implement them; at a low level learn ways to solve professional problems (teaching, education and development of students) in the learning process.

The purpose of the formative experiment was to substantiate and experimentally prove that it is possible to form the correctional and pedagogical competence of primary school teachers based on mastering the basic principles of neuropedagogy and implement it in the process of retraining through correctional and educational activities, including content, forms, methods and means.

The molding experiment was conducted on the basis of the Institute of Correctional Pedagogy and Psychology of the National Pedagogical University named after M.P. Drahomanov of the Educational and Methodological Center for Educational Integration, the Kiev Regional Institute of Postgraduate Education of Teachers and the Kirovograd City Psychological, Medical and Pedagogical Consultation.

The study involved 142 respondents - primary school teachers (72 testing group and 70 experimental group).

For effective formation of correctional and pedagogical competence of teachers in the process of professional retraining technologies of contextual learning were used by Verbytsky (2006), which allowed to form a holistic structure of professional activity of teachers by optimal combination of reproductive and active methods and reproduction of neurosocial context of pedagogical activity.

The sources of the theory of contextual learning are: the concept of context as a condition for understanding the content-forming influence of the teacher's professional activity on the process and results of his educational activity; activity theory of learning, developed in psychology; theoretical generalization of various experiences in the use of forms and methods of active learning, taking into account the neuropsychological nature of the subjectivity of each individual. In particular, the key is the provision on the neurohumoral, neuropsychological and neurosociological potential of the individual to expand their own subjectivity, develop and assimilate sociocultural experience in accordance with the neurobiological inclinations of their own subjectivity (become the highest result of natural and social interaction) (Glozman, 2012). Thus, during the experiment, the neuropsychological and non-pedagogical principle of dominance of subjectivity as the main energy-motivational driver of development applied to both teachers and students.

Neuropedagogical principles of subjectivity, which were implemented in the preparatory process are as follows:

- the subject of study is placed in the position of active activity, the subject of which is gradually transformed from a purely educational to almost professional;
- requirements for professional activity are system-forming, set the contextual principle of construction and study not only of individual disciplines, but also the content of all retraining.

In contextual learning of Verbytsky (2006), three educational stages are used, in which three basic forms of students' activity are realized.

The first stage is a work with theoretical information and involves educational activities of the academic type, in which the leading role belongs to the academic lecture, and the nature of the educational activities of the specialist is mainly reproductive. The results of the teacher's activity within this stage are the reproduction of the received information and the demonstration of the mastered skills of solving standard tasks (algorithms). The algorithm in the neuropsychological sense was considered as an internalized and automated in terms of activity manifestation neuropsychological and operational phenomenon.

The second stage is a specially modeled situation of professional activity, which requires analysis and decision-making on the basis of theoretical information, involves quasi-professional activity (business games and other game forms), the nature of such activity - partial search, reproductive and creative. The results of the activity are substantive actions, the main purpose of which is the practical transformation of simulated professional situations. Neuropsychological mechanisms of this stage are to develop stable and positive patterns of cognitive and transformational activities, and quasi-professionalism promotes the penetration of neuropsychological mechanisms in all activities, not only in pedagogically appropriate acts of interaction.

The third stage is a problem situation or a fragment of professional activity, analyzed and formed in the forms of joint activity of teachers - which is mainly creative (production practice, diploma project). The neuropsychological mechanism of this stage is the emergence of cognitive dissonance, which requires the formation of new neural connections and, accordingly, a new model of decision-making to relieve stress.

The effectiveness of the formation of correctional and pedagogical competence of primary school teachers was ensured by compliance with a set of the following requirements:

- development of the content, forms, methods and means of correctional and pedagogical competence of primary school teachers;
- saturation with the corrective content of the disciplines taught in primary school;
- compliance with the conditions aimed at enhancing the cognitive abilities of children with mental and physical disabilities;
- maximum use in the educational process of correctional and educational opportunities implemented in the secondary school;
- diversification of types of educational and correctional activities of students;

- formation of key teaching and correctional competencies of the teacher;

- active involvement of "healthy" children in educational work together with children with mental and physical disabilities and their parents.

The formative experiment used reproductive methods that promote the development of neuropsychological talents of the basic cognitive properties of the subject: perception, memory and reproduction of information, the acquisition of a significant amount of knowledge and practice of skills and abilities to solve standard problems in the shortest possible time. These methods are used in the first stage of training; active, which maximize the level of cognitive activity. Their essence is to create didactic and psychological conditions that enhance the intellectual, personal and social activity of professionals. Among the active teaching methods there were non-imitation (problem lectures and seminars, discussions, round tables) and imitation (training, analysis of pedagogical situations, business and role-playing games). These methods were mainly used in the second and third stages of contextual learning. The main unit of content in contextual learning was the "problem situation", and the usual tasks and tasks were its elements. With the help of a system of problem situations, learning problems and tasks, a story line of mastering the leading aspects of professional activity was built.

Results

It is established that the majority of respondents are at the average level of formation of correctional and pedagogical competence and have mediocre neuropedagogical competencies (mainly on experience and intuitive understanding). This level includes: in terms of cognitive development 58.1% of primary school teachers with up to 5 years of experience and 52% of teachers with more than 5 years of experience; according to the indicator of the motivational component - respectively 41.9% of primary school teachers with work experience up to 5 years and 33.1% of teachers with work experience over 5 years; according to the indicator of the reflexive component - respectively 68.5% of primary school teachers with work experience up to 5 years and 70% with work experience over 5 years; in terms of the operational component - 24.4% of primary school teachers with up to 5 years of experience and 62.2% of teachers with more than 5 years of experience. The rest of the subjects are classified as low. At the same time, it was established that none of the primary school teachers was referred to the high level of formation of neuropedagogical components of professional readiness.

The data obtained during the observational experiment indicate that the formation of correctional and pedagogical competence of primary school teachers, taking into account neuropsychological patterns and achievements, has not yet been given due attention. Working teachers do not have enough ideas about the inclusive education of children with different neuropsychological abilities in secondary school, the peculiarities of its organization and methods of construction. The concept of "correctional and pedagogical competence" is formed in them at a fairly low level, there is an unconscious need for correctional and pedagogical education, no interest in self-education and self-realization of advanced knowledge and skills, and the importance of correctional and pedagogical work which based on neuropsychological and neurophysiological individual profiles.

It is established that the leading role in the process of formation of correctional and pedagogical competence is played by the teacher's ability to self-analysis and self-development of the main components of correctional and pedagogical activity, independent replenishment of knowledge in correctional pedagogy, special psychology, psychophysiology, neurophysiology.

The most typical difficulties and mistakes that arise in the process of joint learning of children with different cognitive abilities are identified. The reasons for their occurrence are various factors, including the use in teaching principles, methods and tools that are effective in teaching "healthy" children and do not take into account the neurophysiological features (mostly accentuations) of development of students with mental and physical disabilities, stereotypes of teachers in different situations of failure completeness and quality of knowledge, inconsistency of the pace of work in the classroom with their potential and educational performance. Analysis of the results of the statement revealed a lack of awareness of teachers about the peculiarities of mental development of such children, the causes of their psychophysical disorders, the area of current development and features of the educational process in various forms of their education, lack of clear ideas about the structure, content, methods and techniques pedagogical activity. The study does not determine the appropriate level of assimilation of theoretical and methodological knowledge of the phenomenon under study, awareness of its importance for correctional and pedagogical activities, interest and desire to fully master the knowledge, skills and abilities of its effective implementation. The above results indicate a weak professional reflectivity of the teachers themselves and mainly a lack of information about their own neuropsychological profile and the specifics of the subject.

The results obtained at the end of the experiment show that the number of teachers with a high level of formation of the **cognitive** component increased by 53.7%, **motivational** - 52%, **reflexive** - 50.7%, **operational** - 49.2%. Prior to the experiment, no participant in the study reached a high level of formation of all components. Instead, there is a steady downward trend in the number of teachers who have reached a medium and especially low level of formation of key components of correctional and pedagogical activities. Thus, before the experiment, its participants were attributed to a low level of formation of 44.7% - cognitive, 47.7% - motivational, 53.7% - reflexive and 55.3% of the operational components. At the end of the experiment, the number of teachers with a low level of formation of operational, reflexive, motivational and cognitive components decreased to 12%, 12%, 13.5% and 12%, respectively.

The analysis of the results of the formative experiment showed positive changes in the formation of basic neuropedagogical components of correctional competence. It is proved that under the influence of various forms of training of students of advanced training courses (lectures, seminars, practical classes, trainings, pedagogical practice, diploma and course projects) on special curricula and programs the interest in neuropedagogical reorientation of most forms of training grew. conditions for exercising the right to equal access to quality education for all children at their place of residence, the need to replenish the theoretical and methodological foundations of correctional education and the experience of their use in practical work (motivational component). The volume and completeness of knowledge about the peculiarities of children's mental and neurophysiological development, the essence, structure and specifics of correctional work in terms of joint learning of children with different neuropsychiatric abilities, features of individual and differentiated approach in the learning process, formed the ability to apply them in practice (cognitive component).

There was a tendency to increase the indicators of the reflex component, as the main marker of neuropedagogical activity. The positive aspects include the expansion of reflexive abilities (analysis, self-assessment, self-development, self-realization), increased activity and creative attitude to the same operation, actions in different learning conditions (operational component), increased values of the attitude to correction. pedagogical activity in all components. This is evidenced by quantitative indicators of the formation of correctional and pedagogical competence of primary school teachers with an inclusive form of education, presented in table 1.

The dynamics of the formation of correctional and pedagogical competence are presented in table 1.

Table 1. *Comparative dynamics of the formation of components of correctional and pedagogical competence of primary school teachers (%)*

Source: Authors' own conception

Levels	Cognitive		Motivational		Reflexive		Operating	
	At the beginning of the experiment	After experiment	At the beginning of the experiment	After experiment	At the beginning of the experiment	After experiment	At the beginning of the experiment	After experiment
High	0	53,7	0	52	0	50,7	0	49,2
Mediu	55,3	34,3	52,3	36	46,3	35,8	44,7	38,8
Low	44,7	12	47,7	12	53,7	13,5	55,3	12

To obtain statistically important results of comparing data before and after the formative experiment, a nonparametric Mann-Whitney test was used for two independent samples, which makes it possible to establish differences between two independent samples according to the severity of the ordinal variable.

The application of the Mann-Whitney test revealed statistically significant differences in indicators (components) of the formation of correctional and pedagogical and neuropedagogical competence in the two groups of teachers. Comparison of teachers of the testing group with teachers of the experimental group showed significant differences in all components - cognitive ($p \leq 0.001$), motivational ($p \leq 0.01$), reflexive ($p \leq 0.001$), operating ($p \leq 0.05$) (SPSS 15.0) was used for statistical calculations.)

Discussion

Analysis of different approaches of scientists to determine the structure of professional competence of a teacher showed that most scientists, considering professional competence as a structural and functional formation, include a set of knowledge and skills of a teacher and his professionally significant qualities manifested in purposeful activity. The core of competence is the qualities of the teacher's personality, its orientation, motives, values, ability to reflect (Lobanova et al., 1997; Slastenin, 2000; Zaprudsky, 1993). Nevertheless, a separate problem is the low scientific quality and pedagogical applicability of neurosciences available

on the Internet, so leading methodologists on neuropsychological transformation of education support the idea of introducing simple and practical training on neurological improvement of secondary education for teachers (Goswami, 2008).

From the point of view of the competence approach as the purpose and result of training formation of key competences of various level which are shown further in professional activity as competence is provided. Thus, a specialist who has key competencies (professional, personal, etc.) is competent in a particular field of professional activity, including neuropsychological (Lomakina, 1998; Nikitina, 2005; Serikov, 1998).

The holistic structure of the teacher's competence as a set of general, basic, special and private competencies provides:

- general human competence: key semantic and functional competencies;
- professional competence of a teacher: basic professional competence of a primary school teacher;
- private professional competencies of the teacher, ensuring the implementation of a specific pedagogical action, solving a specific pedagogical task (Bobienko, 2005).

The results of the study confirmed the need to strengthen the neuropsychological and neuropsychological aspects of subjective reflection, as well as all types of feedback, which are a prerequisite for neurocorrection in the process of education and self-education (Kazlauskienė, & Barabanova, 2020).

The results of the experiment were confirmed by Chojak's (2018) position, which indicates that for the effective implementation of neuropsychology in school education it is necessary that qualified teachers in this field receive regular data on neuroimaging, which is not yet possible. Therefore, teachers need to be retrained to have more formal but standardized methods for determining the effectiveness of neuropsychological innovations (Chojak, 2018). However, according to the scientist's observations, in Europe the competences of teachers to master the laws of brain function and methods of its psychocorrection are still too low.

The scientific novelty of the research results is that:

- for the first time, the essence and structure of correctional and pedagogical competence as an integration personal education are analyzed, determines the ability of a teacher to carry out correctional functions in the process of inclusive education, taking into account the achievements of modern neuropsychology and related neurosciences;

- general pedagogical and neuropedagogical criteria and levels of formation of the correctional and pedagogical competence of the teacher are defined, presented as the basis for the selection of diagnostic tools;
- substantiated the methodology for the formation of the components of correctional and pedagogical competence of primary school teachers in a comprehensive school;
- clarified the content, forms, methods and means of forming corrective and pedagogical competence based on the neuropedagogy.

The practical significance of the obtained research results is that the developed and experimentally tested method of formation of correctional and pedagogical competence of primary school teachers on the basis of neuropedagogical principles contributes to the effectiveness of its preparation for the implementation of inclusive education. The developed and tested set of methods makes it possible to diagnose primary school teachers actually pedagogical and neuropedagogical levels of formation of correctional and pedagogical competence. Prepared and tested educational and methodological developments in the organization of the educational process aimed at forming the correctional and pedagogical competence of primary school teachers in the process of professional retraining, can be used in the development of curricula (basic educational programs and specialization programs) and neuropedagogical practices in higher, secondary and additional professional pedagogical education.

Conclusions

Based on the analysis of modern psychological, pedagogical and neuropedagogical sources and the results of experimental research, the most typical difficulties and mistakes made by a teacher of a mass school in the process of joint education of children with different neurophysiological abilities are revealed. The reasons for their occurrence are various factors, in particular, the use in teaching principles, content, methods and tools that are not available to students in this category, stereotyped actions in different situations of failure, overestimation of the volume, completeness and quality of knowledge, low teacher culture, his unpreparedness. to such training, the lack of clear ideas about the structure, content, methods and techniques of providing correctional care to the child using neuropedagogical tools.

It is established that increasing the effectiveness of teaching people with neurophysiological development in secondary school is possible if the teacher develops a system of special knowledge: creative abilities, personal qualities mainly reflexive and empathic plan: the ability to observe the child,

to study individual features of neurophysiological and mental development, cognitive needs and interests of children. Thus, the teacher must be competent in the specifics of the organization of inclusive education, the peculiarities of psychophysical development of children with different neurophysiological capabilities; content, methods and techniques of providing correctional care to such students using the methodological achievements of neuropedagogy. Thus, it turned out that the majority of respondents are at a low level of formation of such competencies, and the rest of the respondents are classified as average level of formation of cognitive (53.5% of teachers) and motivational component (33.6% of teachers), which are part of general pedagogical and neuropedagogical aspects of the correctional competence.

Correctional and pedagogical competence is considered as an integrative neuropsychological characteristic of the level of readiness of the teacher for joint learning of children with different neuropsychological properties in the conditions of secondary school, based on a set of theoretical and methodological knowledge, skills and experience necessary for correctional and pedagogical activities, ability to analyze and predict its effectiveness to achieve a pedagogical significant result.

The necessity of applying contextual teaching technology has been proved, which is the basis of a quasi-professional neurosociological approach, allows creating an integrated structure of professional activity of primary school teachers with the help of the optimal combination of reproductive and active teaching methods and reproducing the social context of professional activity using the potential of the content of pedagogical disciplines for positive motivation for implementing inclusive teaching, improving knowledge about developmental features, training and education of various categories of children with special needs of neurophysiological development and the specifics of professional activity of a teacher of a comprehensive school in an inclusive education.

Experimental verification of the method of formation of correctional and pedagogical competence of primary school teachers with an inclusive form of education proved the effectiveness of such a system based on a neuropedagogical approach, efficiency and expediency of use in the process of professional retraining. It is proved that under the influence of various forms of training of students according to the developed method the interest in innovative activity has increased, the necessity and importance of replenishment of special knowledge on the basics of correctional training and experience of its practical realization was realized. The volume and completeness of knowledge about the features of the neuropsychiatric

development of the included students, the essence, structure and specificity of correctional work have grown. At the end of the experiment, there were significant qualitative changes in the indicators of the formation of key components in comparison with the indicators of the ascertaining experiment. In particular, the number of teachers with a high level of cognitive component formation increased by 53.7%, motivational - 52%, reflective - 50.7%, and operational - 49.2%. Prior to the experiment, not a single teacher reached a high level of formation of all components.

At the same time, there is a clear tendency to reduce the number of studied teachers with an average and especially low level of formation of all neuropsychological components of professional readiness. In particular, the number of teachers with a low level at the beginning of the study was: cognitive - 44.7%, motivational - 47.7%, reflexive - 53.7%, operational component - 55.3%. At the end of the experimental study, these figures were 12%, 12%, 13.5% and 12%, respectively.

References

- Beszterczey, S., Nestor, P. G., Shirai, A., & Harding, S. (2013). Neuropsychology of decision making and psychopathy in high-risk ex-offenders. *Neuropsychology*, 27(4), 491–497. <https://doi.org/10.1037/a0033162>
- Bobienko, O. M. (2005). *Klyuchevyye kompetentsii lichnosti kak obrazovatelnyy rezultat sistemy professionalnogo obrazovaniya* [Key competencies of the personality as an educational result of the vocational education system] [Unpublished PhD. Thesis]. Kazan State Technology University.
- Bondar, V., Sinyov, V., & Tishchenko, V. (2012). *Chy pryzyhyvetsya pivnichnoamerykanska model inklyuziyi v Ukrayini?* [Will the North American model of inclusion take root in Ukraine? *Ridna shkola* [Native School], 8/9, 20–27. http://www.library.univ.kiev.ua/ukr/elcat/new/detail.php3?doc_id=1499646
- Bush, S. S. (2015). *Ethical decision making in clinical neuropsychology*. Oxford University Press.
- Bystrup, L. K., Hindhede, P. H., Aadal, L., & Feiring, M. F. (2018). Outline of a history of neurorehabilitation in Denmark – a sociological perspective. *Praktiske grunde. Tidsskrift for kultur og samfunnsvitenskap*, 12(3-4), 5–28. <https://oda.oslomet.no/handle/10642/7572>
- Chebotařyova, O. V. (2007). *Navchannya ditey z porushennyamy oporno-rukbovoho aparatu v umovakh zahalnoosvitnoyi shkoly* [Teaching children with musculoskeletal disorders in secondary school]. In Proceedings of the All-Ukrainian Scientific-Practical Conference in the Framework of the Project “Creation of

- Resource Centers for Parents of Children with Special Educational Needs” with the support of the European Commission. Prydatchenko P. M.
- Chojak, M. (2018). Neuropedagogy as a scientific discipline: interdisciplinary description of the theoretical basis for the development of a research field. *International Journal of Educational and Pedagogical Sciences*, 12(8), 1084–1087. <https://zenodo.org/record/1474341#.X9nwNWQzaAI>
- Della Sala, S., & Anderson, M. (2012). *Neuroscience in education: the good, the bad, and the ugly*. Oxford University Press.
- Gerasymova, I., Maksymchuk, B., Bilozero, M., Chernetska, Yu., Matviichuk, T., Solovyov, V., & Maksymchuk, I. (2019). Forming professional mobility in future agricultural specialists: the sociohistorical context. *Revista Romaneasca pentru Educatie Multidimensionala*, 11(4), 345–361. <https://doi.org/10.18662/rrem/195>
- Glozman, Zh. M. (2012). O subyektivnosti lurievskoy neyropsikologii Lurieva [On the subjectivity of Luriev’s neuropsychology]. *Vestnik Moskovskogo universiteta. Seriya 14. Psikhologiya* [Bulletin of Moscow University. Series 14. Psychology], 2, 31–36. <http://msupsyj.ru/articles/detail.php?article=1550>
- Goswami, U. (2008). Principles of learning, implications for teaching: a cognitive neuroscience perspective. *Journal of Philosophy of Education*, 42(3-4), 381–399. <https://doi.org/10.1111/j.1467-9752.2008.00639.x>
- Kazlauskienė, A. K., & Barabanova, I. (2020). Neuropedagogy: preconditions for application of neuroscience results in the education process while providing feedback. *Technium: Romanian Journal of Applied Sciences and Technology*, 2(5), 112–122. <https://doi.org/10.47577/technium.v2i5.1246>
- Kolupayeva, A. A. (2009). *Inklyuzivna osvita: realiyi ta perspektivy* [Inclusive education: realities and prospects]. Sammit-Knyha.
- Lobanova, N. N., Kosarev, V. V., & Kryuchatov, A. P. (1997) *Professionalnaya kompetentnost pedagoga* [Professional competence of the teacher]. SamVen.
- Lomakina, O. E. (1998). *Formirovaniye professionalnoy kompetentnosti budushchego uchitelya inostrannykh yazykov* [Formation of professional competence of a future teacher of foreign languages] [Unpublished PhD. Thesis]. Volgograd State Pedagogical University, Volgograd.
- Maksymchuk, B., Matviichuk, T., Solovyov, V., Davydenko, H., Soichuk, R., Khurtenko, O., Groshovenko, O., Stepanchenko, N., Andriychuk, Y., Grygorenko, T., Duka, T., Pidlypniak, I., Gurevych, R., Kuzmenko, V., & Maksymchuk, I. (2020). Developing Healthcare Competency in Future Teachers. *Revista Romaneasca Pentru Educatie Multidimensionala*, 12(3), 24–43. <https://doi.org/10.18662/rrem/12.3/307>
- Malofeev, N. N. (1996) *Spetsialnoye obrazovaniye v Rossii i za rubezhom* [Special education in Russia and abroad]. Pechatnyi dvor.

- Melnyk, N., Bidiuk, N., Kalenskyi, A., Maksymchuk, B., Bakhmat, N., Matviienko, O., Matviichuk, T., Solovyov, V., Golub, N., & Maksymchuk, I. (2019). Modely y orhanyzatsiyone osobyne profesyonalne obuke vaspytacha u pojedynym zemľama Evropske Unije y u Ukraïny [Models and organizational characteristics of preschool teachers' professional training in some EU countries and Ukraine]. *Zbornik Instituta za pedagogska istrasživanja*, 51(1), 46–93. <https://doi.org/10.2298/ZIPI1901046M>
- Nechyporenko, V. V. (2013). *Systemnyy rozvytok navchalno-reabilitatsynoho tsentru yak vidkrytoyi innovatsynoyi sotsial'no-osvitn'oyi instytutsiyi* [System development of the educational and rehabilitation center as an open innovative social and educational institution]. Publishing House of the Khortitsa National Training and Rehabilitation Multidisciplinary Center.
- Nerubasska, A., & Maksymchuk, B. (2020). The demarkation of creativity, talent and genius in humans: a systemic aspect. *Postmodern Openings*, 11(2), 240–255. <https://doi.org/10.18662/po/11.2/172>
- Nikitina, G. V. (2005). *Pedagogicheskiye usloviya razvitiya klyuchevykh pro-fessionalnykh kompetentsiy budushchego uchitelya v pedagogicheskom kolledzhe* [Pedagogical conditions for the development of key professional competencies of a future teacher in a teacher training college] [Unpublished PhD. Thesis]. Irkutsk Institute for Educators' Advanced Training, Irkutsk.
- Onishchuk, I., Ikonnikova, M., Antonenko, T., Kharchenko, I., Shestakova, S., Kuzmenko, N., & Maksymchuk, B. (2020). Characteristics of foreign language education in foreign countries and ways of applying foreign experience in pedagogical universities of Ukraine. *Revista Romaneasca Pentru Educatie Multidimensionala*, 12(3), 44–65. <https://doi.org/10.18662/rrem/12.3/308>
- Ross, J. M., Duperrouzel, J., Vega, M., & Gonzalez, R. (2016). The neuropsychology of risky sexual behavior. *Journal of the International Neuropsychological Society*, 22(6), 586–594. <https://doi.org/10.1017/S1355617716000400>
- Serikov, V. V. (1998). *Lichnostno-oriyentirovannoye obrazovaniya: poisk novoy paradigmy* [Personality-oriented education: in search of a new paradigm] [Unpublished PhD. Thesis]. Volgograd State Pedagogical University.
- Sheremet, M. K. (1997). *Psykhologo-pedagogichni osnovy pidbotovky slabochuyuchykh ditey do navchannya v shkoli* [Psychological and pedagogical bases of preparation of hearing-impaired children for training at school] [Unpublished PhD. Thesis]. The Institute of Defectology of the Academy of Pedagogical Sciences of Ukraine, Kyiv.
- Sheremet, M., Leniv, Z., Loboda, V., & Maksymchuk, B. (2019). The development level of smart information criterion for specialists' readiness for inclusion

- implementation in education. *Information Technologies and Learning Tools*, 72, 273–285. <https://journal.iitta.gov.ua/index.php/itlt/article/view/2561>
- Slasterin, V. A. (2000). *Pedagogika* [Pedagogy]. Shkola-Press.
- Studzińska, A. (2012). *EEG Biofeedback w szkole* [EEG Biofeedback at school]. Biofeedback. <http://www.biofeedbackwszkole.pl/eeg-biofeedback-w-szkole.php>
- Verbytsky, A. A. (2006). *Sovershenstvovaniye kachestva podgotovki pedago-gicheskikh kadrov s pozitsii teorii kontekstnogo obucheniya* [Improving the quality of training of teaching staff from the position of the theory of contextual education]. In Proceedings of the VII All-Russian Scientific and Practical Conference on Integration of Methodological (Scientific and Methodical) Work and Systems for Advanced Training of Personnel. Obrazovaniye.
- Voigt, T. H. (2019). Beratung, Coaching und Neurowissenschaft – Produktive Zusammenarbeit oder geschickte Vermarktung? *Organisationsberatung, Supervision, Coaching*, 26, 339–350. <https://doi.org/10.1007/s11613-019-00612-z>
- Zaprudsky, N. I. (1993). *Nauchno-pedagogicheskoye obespecheniye porysheniya kvalifikatsii uchiteley yestestvenno-matematicheskikh predmetov* [Scientific and pedagogical support for advanced training of teachers of natural and mathematical subjects] [Unpublished PhD. Thesis]. The National Institute of Education, Minsk.