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Neuro-Pedagogical Aspects of Forming the Professional Competence of Elementary School Teachers and Their Interaction with Students

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Abstract: It was found that the concept of modernization of Ukrainian education, especially primary education in the reform "New Ukrainian School", puts forward new social requirements for school education, requires the introduction of innovative learning technologies in the educational process, the basis of which is ultramodern teaching methodology, progressive didactic tools, psychological and neuro-pedagogical theories.
Justified the use of innovative technologies as a means of forming professional competence, which is associated with a rejection of stereotypes in education, goes beyond existing standards of education and personal development of the student; creates new standards for personal, creative, individual focus of the teacher, allows the application of new neuro-pedagogical technologies.
The most effective innovative methods of teaching and professional development of teachers of junior classes of the New Ukrainian school, created taking into account the achievements of neuro-pedagogy are highlighted, namely: game, problem-oriented, team-oriented, project-based methods, the portfolio method, information and communication technologies.
Activation of cognitive activity of students, taking into account their individual neuro-didactic characteristics affecting the degree of their involvement in the educational process was investigated.

Keywords: *Reforming the educational process; elementary school; professional teaching competence; neuro-pedagogy; neuro-didactics; innovative teaching methods.*

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Introduction

Today in Ukraine, the formation of an innovative system of school education, which focuses on harmonization with the single global educational and information space, and provides for radical rethinking and transformation of the theoretical and practical basis of the educational mechanism. That is why a special aspect is the introduction of an innovative component in the training and retraining of elementary school teachers and their subsequent implementation of the innovative component in the work of educational institutions. Among the innovations in the educational process, the introduction of the achievements of related sciences, especially neuro-pedagogy and information technology, which have been used for many years in the school education system of the developed world, takes a significant place (Karasievych et al., 2021; Kosholap et al., 2021; Prots et al., 2021).

The widespread application of neuro-pedagogy to education is due to the fact that this field of science investigates brain function, along with behavioral data, which can contribute to a better understanding of basic learning processes and can lead to improved teaching (Berbets et al., 2021; Demchenko et al., 2021; Howard-Jones, 2014; Sarancha et al., 2021;). At the same time, the world scientific community has not yet completed the definition and conceptualization of neuro-pedagogy (Lagemann, 2000). Research in this field of neuroscience is relatively new, but the results have scientific value and interest the world pedagogical community.

In general, the success of the reform of school education in Ukraine depends on how capable all subjects of the education system to maintain its competitiveness, with the introduction of the concept of the New Ukrainian school, the most important requirement for the teacher is the presence of such qualities as initiative, activity, the ability to think creatively and find innovative solutions. In this context, the main directions of development of the New Ukrainian school is the creation of an innovative educational environment and improving the professional competence of teachers through the use of educational innovations aimed at the disclosure and development of students innate and acquired abilities. Thus, it can be noted that the driving force behind the New Ukrainian School is active teachers who have mastered the knowledge of information and communication technologies and neuro-pedagogy, show initiative, are clearly aware of their professional goals, are able to be a mentor and coach for young students, a facilitator for everything new, and are optimistic about innovation.

Implementation of effective ways of professional development of teachers in the conditions of innovative educational field of the New Ukrainian school as a productive environment of andragogical influence provides optimal conditions for stimulating the training, education and self-improvement of a formed specialist, an adult, in the process of his professional training.

The concept of modernization of Ukrainian education, primarily primary education, in the framework of the New Ukrainian School, puts forward new social requirements for the system of school education, requires the introduction into the educational process of innovative learning technologies based on new methodological foundations, modern didactic principles and psychological and neuro-pedagogical theories that develop activity-based, creative approach to learning, Paniotova (2020)

The problem of teacher's professional competence has been studied by both educators and psychologists. Peculiarities of forming and improving professional competence are revealed in the works of such foreign scientists as Adolf (1998), Brazhe (2007), Zeeer (2009), Bloom (1956), Marcus (1986), Pizzolato (2007). They are also devoted to the studies of prominent classics of national pedagogy, namely Makarenko (1984), Sukhomlynsky (1988), and Shenderovskyi (2009).

Modern educational innovative concepts take place in the studies of Bekh (2012), Danylenko (2015), Dychkivska & Hryhoreva (2011), Matsko (2016), Paniotova, 2020, and Khutorskoi (2005).

The level and degree of teachers' readiness to use psychological and pedagogical technologies in professional activity in foreign and domestic pedagogy were studied in the scientific works of Volkova (2007), Koval (2011), Myronchuk (2014), Miller (2015), Piekhota & Ziaziun (2003), and Rybalko (2017).

Educators' use of the findings of cognitive neuroscience in their professional work and their use of new ways to enrich their own pedagogical knowledge base has been examined in the research papers of Furlong (2013), Geek & Cooper (2003, p.11), Bransford et al. (2000), Blakemore & Frith (2005), and Davies (2004).

Giving props to all of the above-mentioned authors for the thoroughness and conceptuality of their research, it should be noted that the mechanism of forming the professional competence of elementary school teachers of the New Ukrainian school in the light of the application of neuro-pedagogical concepts in the educational process is not studied enough, lacks a holistic and systematic approach to addressing this issue.

The purpose of the article is to summarize, characterize and determine the individual neuro-didactic characteristics of individuals affecting the degree of their involvement in the educational process, as well as the specificity of the use of innovative neuro-pedagogical technologies that can be used in the formation of professional competence of primary teachers of the New Ukrainian school and the feasibility of their use in the teaching and educational process of elementary school.

The formation of professional competence of elementary school teachers in the new ukrainian school

Modern radical transformation of school and society in the context of the reform of the "New Ukrainian School" pose requirements for teachers to rethink their teaching activities with an innovative component and world teaching experience. The result in the Ukrainian reality was the development and application of modern educational technologies, as well as the strengthening of interaction between science and school. Also a significant result is the widespread use of psychological and pedagogical support for children, considered as a special type of interaction between teacher and pupil, aimed at creating conditions for the self-development and self-education of children, forming in them the ability to independently implement their life plans. The result of this is the formation of an individual educational trajectory that provides individualization of the educational process.

According to the Standard of higher education, the professional competence of a teacher is a property of the individual, manifested in the ability to solve complex specialized tasks and practical problems in professional and pedagogical activity, involving the application of theoretical provisions and methods of pedagogy, psychology and individual teaching methods and characterized by complex and uncertain conditions (Standard of Higher Education in Ukraine, 2018).

The use of innovative technologies as a means of forming professional competence is associated with the rejection of known stamps, stereotypes in education, education and personal development of the student; goes beyond existing norms, creates new standards of personal and creative, individual focus of the teacher, allows the application of new neuro-pedagogical technologies (Strutsenko, 2003).

The process of forming the professional competence of the elementary school teacher in the context of the reform "New Ukrainian School" was built on years of integration and fundamentalization of

knowledge. It is based on systemic, competence, personality and activity approach, axiological and contextual approaches to specialist training in the educational process, the resource opportunities of which in professional higher teacher education are actualized through the use of innovative technologies, modern forms and methods of learning (project activities, social partnership, moderation method, case-study, trainings, business games, etc.). The process of professional training of teachers in the context of the New Ukrainian school is constructed so that there is an opportunity to continuously improve the innovative competence of a specialist, the fundamentality of his educational and professional training, the formation of the necessary personal characteristics, the implementation of both invariant and differentiated requirements for the teacher (Hryhoreva, 2011).

The conditions for modernization of professional training of elementary school teachers in the system of higher teacher education in the context of the New Ukrainian School were:

1. Studying the positive experience of modernizing the professional education of elementary school teachers at universities in Ukraine and abroad.

2. Justification of criteria for personal and professional development of elementary school teachers both in the process of university and postgraduate education.

3. Development of a model for the formation of innovative culture of the teacher and pedagogical conditions that form the basis of this process.

4. Achievements and discoveries in the field of neuroscience, the introduction of which into the educational space allows to move it to a qualitatively new level.

5. Modernization of the educational space of higher school as an environment for the training of a new type of elementary school teacher, who has high spiritual and moral values and has modern communicative abilities, which allow to be active and mobile in the implementation of innovative technologies.

6. Development in future teachers of primary classes of new competencies due to the creation of a high-quality innovative environment, activating students to master new means and methods of communication, tools of language culture, ideas about the logic of construction, the structure of innovative technologies.

An elementary school teacher who is ready to innovate and has a high level of established innovation culture should have the following personal and professional characteristics:

• ability to learn, assimilate, and implement new discoveries made in fields related to pedagogy;

• sustained interest in technological innovation, motivation for creative activity, self-improvement and self-realization in professional activity, overcoming difficulties in innovative activity, psychological attitude to innovative activity;

• knowledge of innovative technologies, understanding of the goals of innovations in primary education pedagogy, knowledge of modern innovations in practice with younger students;

• awareness, ability to critically analyze own innovations, critical thinking, adequacy of professional self-assessment;

• high level of development of the ability to see individual-typological features of primary school children and to create innovative programs in accordance with the features of each child;

• ability to develop and implement innovative technologies and programs in the practice of the educational institution;

• ability to find and evaluate innovations, development, implementation and use of innovative technologies in pedagogical work with elementary school students;

• ability for personal and professional growth (Smoleusova, 2012).

The comprehensive application of educational innovation technologies in the world attaches particular importance to the professional competence of teachers. That is, its level determines the degree of achievement and demand for the teacher. At the same time, a significant part of teachers experience difficulties in rapidly changing adaptation in socio-psychological and technical conditions. In this case the insufficient level of mastery of innovation becomes a factor of internal dissatisfaction and aggression towards others. That is why the professional training of elementary school teachers, the program which took into account the achievements of neuro-pedagogy and applying innovative technologies is becoming increasingly important, contributed to the growth of pedagogical skill (Pecherkyna et al., 2011).

Given the above, it should be noted that one of the main ways of reforming education in the New Ukrainian school is training a new generation of teachers with the tools of innovative techniques and technologies related to pedagogy industries.

Neuro-pedagogical aspects of forming the professional competence of elementary school teachers and their interaction with students

Modern requirements of primary education in the context of the concept of the New Ukrainian school requires innovative approaches not only to the implementation of the educational process in the elementary school, but also the formation of professional competence of elementary school teachers by means of neuro-pedagogy, Pekhota (2003). Over the past 15 years, there have been several appeals to use the findings of neuro-pedagogy to guide educational research and practice (Bruer, 1997; Bransford et al., 2000; Blakemore & Frith, 2005; Davis, 2004; Geake & Cooper, 2003).

The worldwide practice of elementary school teachers acquiring knowledge of neuro-pedagogy without discontinuing the educational process gives a new perspective on learning, when teachers begin to perceive themselves as innovators and architects of educational experiences, ultimately changing the brains and worldview of students. Understanding that neural circles develop and strengthen with all experiences, including practice and play, as well as formal and informal learning is fundamental to anyone taking on the role of leading, mentoring, teaching children in elementary school. Undoubtedly, elementary school teachers would benefit from having this perspective in their theoretical toolkit, just as they would benefit from understanding the essence of the neuro-pedagogical component of the educational process, and, in accordance with this, change their attitude toward representational resources (Diamond & Amso, 2008; Sternberg, 1996).

The overall goal of neuro-pedagogical science is to build an educational system in such a way that it takes into account the individual neuropsychological features of students, based on knowledge of the patterns of processes occurring in the structures of the human brain and psyche (Podlinyaev & Mornov 2015). Thus, the optimal physical, intellectual, creative, spiritual, moral and professional development of man, the satisfaction of his educational needs and interests, based on the laws of brain development. Modern neuro-pedagogy includes neuro-diagnostics, development of corrective and developmental support for the student and neuro-didactics. It studies the organization of conditions for effective learning based on the results of research on the functioning of brain structures and the nervous system (Vygotsky, 1956).

Therefore, it can be noted that the main task of current neuro-pedagogy in the training and professional development of primary teachers of the New Ukrainian school, is to identify their individual

neuropsychological features in the formation of professional competence by innovative means, as well as neuro-didactic characteristics of students in order to develop and practice psycho-efficiency of professional teachers and optimization of the educational process in the elementary school. Ignoring the specifics of neuro-didactic manifestations of education applicants in general, adults in particular, leads to negative consequences in the formation of professional competence (Malsagov, 2016).

Neuro-pedagogy, based on the latest achievements and discoveries in the field of neuroscience, seeks to build a system of training and education that optimally takes into account the individual neuro-didactic characteristics of individuals (Fig. 1). These features include: the individual lateral profile; features due to a person's article (gender differences); type of temperament; type of sensory-perceptual organization (modality of internal experience) (Moskvin, 2008; Moskvin & Moskvina, 1997); level of development of higher mental functions; correspondence of neuropsychic features of the teacher and students (Luria, 1975, p. 19; Vygotsky, 1956, p. 130).

1. Individual lateral profile (hereinafter referred to as ILP)

The concept of lateral features of a person (left-handedness, right-handedness), according to which the partial dominance of certain brain areas determines the presence of individual differences in the implementation of a number of mental processes: thinking, memory, attention, emotions, will, etc. I.P. Pavlov distinguished three types of functional asymmetry of the brain hemispheres: left hemispheric, right hemispheric and equal hemispheric (no pronounced dominance of one of the hemispheres) (Pavlov, 1951, p. 34). The left hemisphere is responsible for operating with verbal-sign information, logical thinking, and short-term memory. The right hemisphere is responsible for handling figurative information, emotions, and long-term memory. The lateral profile to a significant extent describes the psychological characteristics of the student, his personal abilities, cognitive and creative abilities. Teachers ignoring the specifics of the manifestation of students' lateral profile leads to the most negative consequences both in the didactic context and in the context of health.

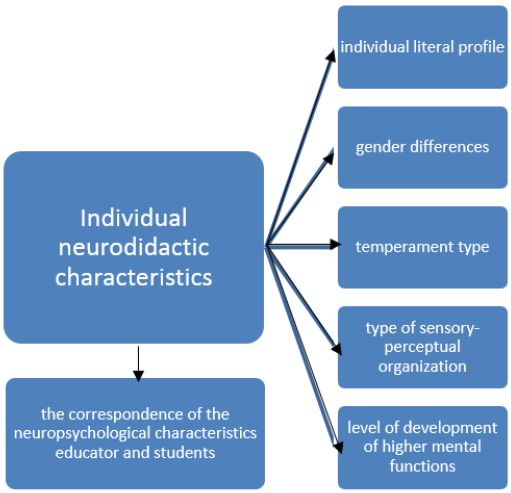


Fig. 1. Individual neuro-didactic characteristics of individuals that influence the degree of their involvement in the educational process

* Developed by the authors using (Moskvin, 2008; Moskvin & Moskvina, 1997)

2. Gender differences are a consideration in the educational process neuropsychological and psychophysiological features of development, as well as the activities of boys and girls. Modern domestic and foreign scientists (Bandura & Walters, 1963) state the ineffectiveness of genderless pedagogy - the use of the same forms, methods, techniques and content in the training and education of representatives of different articles. Thus, the goal of gender education is to create conditions for the formation of egalitarian consciousness, free of gender stereotypes, (Samoilenko, 2018).

Gender culture of elementary school students is a subjectively determined system of values, gender norms of behavior that contribute to the implementation of the abilities of students of different sexes as equal social beings, form the gender qualities of the individual by implementing certain pedagogical conditions in the educational activities of the elementary school, determine the choice of appropriate strategies for gender identity students (Vovk, 2015).

3. Character type. Represents consideration of psychodynamic features of students in the process of learning and education.

The study of psychodynamic features, their connection with the state of physical qualities of schoolchildren promotes the activation of the individual in learning, optimizes the mechanisms of its physical education,

stimulates the use of differentiated and individualized approaches in the educational process (Bondarchuk & Chernov, 2019).

In modern neuro-pedagogy it is accepted to allocate such psychodynamic properties of the personality as mental activity and reactivity, motor component, emotionality, extraversion or introversion, rate of course of mental reactions, plasticity and rigidity (Dubrovina et al., 1998).

When organizing and conducting classes in elementary school, the teacher must provide for the potential relationship of the type of temperament of the pupil with personal qualities and abilities.

4. The type of sensory-perceptual organization of experience (internal experience modality) is the leading channel of perception and processing of information by students. As a rule, three modalities are distinguished: visual (from Latin visualis - visual), auditory (from Latin audio - hear) and kinesthetic (from Greek kinematos - motion). Any healthy person has all the above modalities. However, the degree of their expression is different.

Perceptual activity plays an essential role in adaptation as one of the conditions of personal self-realization. The latter is especially important in the context of the position about the necessity of reorientation of a person from passive perception to active, integrated perception of various modal sensations, which leads to full contact with oneself, clear vision of ourselves, other people and the world (Kostyuchenko, 2015).

Possibilities of sensory-perceptual activation are realized with the help of such well-known psychotechniques as: regenerative nutrition, auto-phytoregulation, physical and motor activity (bioenergetic level); Psychotechniques of adaptive biocontrol with biofeedback, progressive muscle relaxation, anti-stress relaxation, autogenic training, systematic desensitization; breathing techniques; body-oriented techniques; meditation (psychophysiological); neurolinguistic programming, Design Human Engineering; Cognitive and rational-emotional techniques of A. Beck and A. Alice (cognitive); psychosynthesis of R. Assagioli; Gestalt techniques of needs awareness; techniques to develop asertive and positive thinking, etc. (Frankl, 1990; Rogers, 1994).

5. Level of development of higher mental functions.

Consideration in the educational process of the individual dynamics of mental processes (memory, voluntary attention, imagination, thinking, speech, will, emotions) provides intellectual, cognitive and creative activity, speech and communication, self-regulation of students.

According to L.S. Vygotsky (1956) and A.R. Luria (1975), higher mental functions are not given to a person in a ready-made form. They

overcome a long heterochronic and asynchronous route of development, which determines the individual features of learning. The teacher's requirements must match the degree of development of the students' brains. Late instruction reveals problems in learning, as higher mental functions are slowed. This explains the necessity of using special forms, methods, techniques and technologies aimed at the development of the cognitive sphere of adults. This provision correlates with the subsequent direction of neuro-didactics.

6. Correspondence of neuropsychological features of the teacher and students. Teachers' styles of presenting educational material should correlate with students' styles of perception and assimilation of information depending on individual laterality profiles, as their discrepancies can lead to cognitive dissonance. Individual characteristics of both play an important role in cooperation between students and the teacher. In particular, left-hemispheric individuals are more inclined to perceive persuasive, rational influences, and right-hemispheric - emotional, suggestive, because they are more conformal.

The relationship between the subjects of the educational process should be based on a person-centered approach, based on trust in human nature and faith in the ability of constructive, responsible and free self-development, which is provided by a unique for each and unique biological system - the brain (Malsagov, 2016).

While neuro-pedagogy does not dictate specific practices that take into account the individual neuro-didactic characteristics of individuals, it does provide teachers with a knowledge base for making pedagogical choices in advance or during the lesson. The better a teacher understands the neurobiological processes that occur in a student's brain, the more effective his professional activity will be. Therefore, Shulman outlined seven different types of knowledge required of teachers in their profession: essential knowledge, general pedagogical knowledge, pedagogical content knowledge, theoretical knowledge of educational philosophy/theory, curriculum knowledge, knowledge of educational systems, and knowledge of students (Shulman, 1987).

Teachers who are aware of brain function can help their students develop their brain potential--regardless of past performance--to bridge the achievement gap and reach their high potential. To be an educator today without understanding the implications of brain-altering neuroplasticity is a great loss for teachers and their future students (Willis, 2012).

The concept of the New Ukrainian School is aimed not only at forming an innovative educational system by individualizing learning and

applying the idea of child-centeredness, but also at transforming the teacher-student relationship. Successful realization of both the first and the second tasks is possible only when a teacher has mastered the achievements of the scientific field in the allied sciences and their active application in the educational process. That is why mastering the basic knowledge of neuro-pedagogy by elementary school teachers in the New Ukrainian School is extremely important. Teachers who use neuro-pedagogical knowledge and techniques in their teaching and communication with students report that neuro-pedagogy has changed the way they think about their students, indicating increased knowledge about children's needs and abilities. More and more elementary teachers in the New Ukrainian School are using their knowledge of students' neuroscience to choose appropriate forms or techniques of instruction, whether specific or general, based on their own pedagogical knowledge. Neuropedagogy has provided a framework from which teachers can prioritize and make appropriate pedagogical decisions. Thus, neuro-pedagogy provides teachers with useful knowledge that they can use in their practice. These results satisfy Clement and Lovat's (2012) criteria for how neuro-pedagogy relates to education.

Thus, modern neuro-pedagogy, having passed the period of formation, represents today applied neuroscience. Thanks to its emergence of differential psychophysiology, cognitive neuroscience and pathopsychology, it allows us to solve supercomplex multi-vector questions characteristic of the pedagogical process.

Innovative technologies as a tool for developing the professional competence of elementary school teachers: neuro-pedagogical perspective

The main goal of learning in the context of the New Ukrainian school is to provide a positive motivation for learning; activation of cognitive activity of students, taking into account their individual neuro-didactic characteristics. An important area of innovation is for teachers to master new neuro-pedagogical systems, technologies, teaching methods and techniques in order to achieve better results (Leech & Onwuegbuzie, 2008).

We can distinguish the following most effective innovative methods of teaching and professional development of teachers of junior classes of the New Ukrainian school, created with the achievements of neuro-pedagogy: game, problem-oriented, team-oriented, project, portfolio method, information and communication technologies.

I. Play tear.

According to system-vector psychology, man is a conscious and sensual form of life. And it can be realized only through interaction with other people. Play forms of teaching children combine such major psychological components as the conscious and sensual form of perception of information and active interaction between students. That is, play forms of learning are the very sensual component that activates the brain to solve complex problems. Game is a unique tool of neuro-pedagogical influence that allows to use all types of neural connections and contributes to a better mastering of the material (Vinnikova, 2017).

Play forms of education of children of primary school age - a variety of types of games, for example: story, movement, drama, conferences, quests, deciphering different puzzles, etc.

The play form of work with younger schoolchildren is especially important for the period of the child's adaptation to school. It is connected with the fact that in preschool educational institutions the main activity of the child was play, through which learning of the world and acquisition of new knowledge took place (Miller, 2015). Play forms of learning are suitable for relieving stress after a difficult task. They can be alternated with standard learning tasks.

Emotional involvement is a very important factor in bringing the children together. Then they have common memories, emotionally vividly colored.

In today's lessons teachers use neuro-didactic games as the main element of play activity. Introducing elements of the game allows the teacher to solve several problems at once, because the game allows to entertain, teach and educate at the same time. Playing actively involves educational applicants in the process of learning, which is especially important for children who are passive and have problems in learning. In addition, the play form of learning allows for a greater amount of work to be done than when teaching in traditional methods. Play strengthens motivation to learn and confidence in oneself as a student (Elouafi et al., 2021).

Students are always enthusiastic about the teacher's suggestion to play. After all, the game itself evokes positive emotions. This is due to the opportunity to show off some of their talents, and stand out against the other children in the class.

II. The method of problem-oriented learning.

This method solves complex problems through students' grasp of certain concepts and principles. It develops critical thinking skills, activates the ability to solve problem situations (Duch et al., 2001).

According to Jalal and Sardjunani, problem-based learning is characterized by problem-oriented techniques and a tutor. This method is widely used in the learning process. It is especially characteristic of school institutions of democratic societies.

The problem-oriented teaching model is based on the belief that teachers should teach by engaging students' natural instincts to explore, (Abidin, 2014, p. 158). The problem is presented as thoroughly as possible and students work with it, which requires them to apply their knowledge according to their level of psychological maturity and neuro-didactic ability to learn.

The reason for choosing the problem-oriented learning model is that this model has a deeper potential that can enhance students' high thinking ability, can deepen the understanding of the discipline, which will give them pleasure in learning, develop their positive attitude towards the educational process, open up leadership, affect students' curiosity, increase their self-confidence. Research by Joo & Park (2015), suggests that problem-oriented learning is effective in improving students' information literacy.

Problem-oriented learning is used because it has certain advantages, is the best technique for better understanding the content of the lesson, can enhance students' learning and help them understand the problem in real life. Fatade's (2013) research recommends the use of problem-oriented learning as a learning strategy to improve student performance in cognitive and non-cognitive outcomes.

The teacher needs to teach children to observe, compare, and draw conclusions, and this, in turn, will help lead students to the ability to acquire knowledge independently, rather than to obtain it ready-made.

Occurrence of a problem situation and its awareness of students is possible in almost every discipline and topic. Application in the educational process of problem situations helps the teacher to fulfill one of the most important tasks - to form in students an independent, active, creative thinking. The knowledge, skills acquired through active search and independent problem solving are stronger than in traditional teaching.

III. The method of team-oriented learning.

Team-oriented learning is defined as "active learning and small-group instructional strategies that empower students to apply conceptual knowledge through a sequence of activities involving individual work, teamwork, and immediate feedback" (Parmelee et al., 2012).

Team-oriented learning allows for engaging teaching, engages a significant number of students, provides instant feedback, engages students

in decision-making, and promotes active small-group discussions (Burgess et al., 2014).

Group forms are able to teach the child the ability to communicate, to work in a group (team), to express his/her opinion and to argue with evidence. These forms of learning imply the creation of such conditions, in which students actively interact.

Team-oriented learning provides an innovative approach to the student-centered educational process, supporting the flipped classroom method (Burgess & Mellis, 2015).

In recent years, team-oriented learning has gained popularity in elementary education as a resource-efficient, student-centered learning pedagogy that is sometimes introduced as an alternative to problem-oriented learning and is more understandable to younger students than the problem-oriented learning model. Compared to the form of problem-oriented learning, team-oriented learning retains the advantages of small group instruction, but, importantly, without the need to involve a large number of teachers.

Team-oriented learning is appropriate for teaching literary reading, math, design and technology, I'm exploring the world).

IV. Project-based learning method

A project is a special task, a plan, an idea, a way to solve a problem. The result of this method is the formation of innovation.

The project method is a way of teaching in which the student himself is involved in an active cognitive process; he formulates a learning problem, collects the necessary information, plans options for solving the problem, draws conclusions, and gains new learning and life experiences. Consequently, the success of this method is determined by the extent to which students can focus and organize their learning. This ability, which scholars call self-regulation, and its development in the student is the goal of this method consider failure and as a regular and important part of the learning process (Schell, 2017).

In order to increase self-regulation, teachers must be on a constant search for tools to enhance student self-efficacy thinking. Students receive information that stimulates their self-efficacy in learning through the following factors:

1. Active mastery: completing learning tasks, experiencing failure, and achieving success.

2. Vicarious experience: observing and comparing one's own abilities in certain academic disciplines with peers.

3. Verbal persuasion: direct feedback from influential people who have authority with the student in a particular area gives clues about the student's abilities and competencies. The most persuasive feedback that shapes the self-efficacy of the younger student is not about a specific person (e.g., you're smart), but rather about effort (e.g., I like how you made it through the problem, even though it was hard) (Wood & Bandura, 1989).

When applying the project-based method, it is important to develop activities through which students solve increasingly complex problems. Because the hallmark of design thinking is working with the unknown, it is especially important that design tasks be at the desired level of difficulty (not too difficult, not too easy) where there is ambiguity and students must solve unfamiliar situations independently. Therefore, learning experiences must be carefully designed to be consistent with self-efficacy theory and the principles of self-regulated learning.

By implementing the project-based method in the educational process through self-efficacy pedagogy, teachers can promote self-regulated learning through:

• Introducing activities through which students will gradually engage in the solution of desirably complex problems that form real project thinking.

• Providing specific opportunities for students to learn with their peers who are role models, so they can gain useful information about their abilities by comparing their learning with others.

• Providing activities through which students receive intelligent feedback from peers and teachers (Yeager et al., 2014). Intelligent feedback is a teaching approach through which the teacher identifies and enforces high standards for students while expressing a belief that their students can meet or exceed those standards.

• Given the fact that students learning using the project-based method experience cognitive overload of working memory. Learning something new, especially when it is difficult, can stress elementary school students and create a sense of inadequacy, which generates errors that are not based on actual competence (Paas, 1992). Therefore, teachers should create opportunities for students to rest in order to restore their working memory and reduce stress during class.

V. The portfolio method.

In general, a portfolio is a technology for accumulating and systematizing information, that is a way of recording, accumulating and evaluating the work, the results of the student and a tool that characterizes the dynamics of individual achievement in different areas throughout the

years of schooling. Paulson, Paulson and Mayer (1991, p. 60) define a portfolio as a purposeful collection of students showing a student's efforts, progress and achievements in one or more disciplines and areas of non-formal education.

Grace (1992, p. 1) who has researched the use of the portfolio method specifically for the elementary school setting, defines "portfolio" as a record of a child's learning process: what the child learned and how she learned; when learning began; how she thinks, questions, analyzes, synthesizes, produces, creates; how she interacts - intellectually, emotionally and socially - with other children and adults.

This form of assessment is thought to encourage a closer connection between assessment and learning by improving learning outcomes through assessment and providing feedback. The use of portfolios is also thought to improve assessment of areas of learning that are difficult to assess by traditional methods in a wide range of clinical contexts (Davis & Ponnamperuma, 2006). Portfolios are increasingly being used in post-graduate teacher education to assess a teacher's ability to progress.

But the use of this method of teaching in the elementary school, even in the implementation of the reform "New Ukrainian School" is limited because it contains somewhat complex application criteria and requires a significant time interval for the accumulation of productive information and related achievements. Therefore, it is used mainly in the educational process of elementary school in grades 3-4 and more widely - in high school.

VI. Information and communication technology.

Information and communication technologies of education have been widely used in the educational and developmental work of the elementary school teacher. Such learning technologies include computer programs of educational and developmental nature. Their use contributes to the development of cognitive processes in elementary school students; increasing the effectiveness of learning and learning motivation of students, as well as the development of their intellectual and creative capabilities (Inforurok, 2018).

In most cases, ICT instruction in elementary schools is based on the use of the World Wide Web, e-mail, and multimedia software resources to create products and presentations, support communication, and search for information (Kozma, 2003).

The main forms of ICT learning in the junior school are:

1. Developmental computer games. The simplest and the most accessible type of development of abilities of primary school age children, most often cognitive, are developing computer games. They include logic

games, cognitive games, developmental games, etc. A number of games can also be used to correct basic emotional and behavioral disorders (aggressiveness, withdrawal, fears, etc.).

2. Developmental computer simulators. These are psychological simulators aimed at the development of a particular quality or skill (training of attention, thinking, perception). It is most convenient to use the simulator during individual developmental work because the child works with it directly, and the teacher only observes the process, controls the correctness of performance, helps if necessary. The main idea of such lessons is that the basic exercises are given to children verbally or in writing, but on a monitor screen, that is visually. The advantage of such lessons is the brightness and colorfulness of the tasks, the possibility to show animation, audio and video images. The child can alternate written tasks with computer tasks, which will increase their interest in lessons and increase their efficiency. The main purpose of such programs is to develop a set of abilities and qualities of the student (Altukhova, 2021).

3. Media lessons. Many elementary school teachers in the New Ukrainian School conduct lessons using media technology. These lessons have the status of media lessons and are conducted using presentations (Power Point, Prezi).

Cartoon studios allow you to simulate any situation of interaction, as well as to create your own cartoons. The teacher can, together with the child, develop a storyline of a cartoon simulating a particular situation. The use of the cartoon studio promotes the schoolchild's self-esteem, teaching him/her the skills to manage himself/herself in specific situations. The teacher can offer the students both the cartoons they created themselves, but unfinished (to continue with the children), and just the themes to create cartoons. The cartoon studio, as well as various teaching aids, can be created independently with the help of the computer program Flash.

4. Psychological computer programs. These are auto-training type programs designed to relax, stimulate, develop elementary school students. For example, to relieve physical tension and optimize mental activity or relieve stress with the help of an eye movement integrator. If an educational institution has a relaxation room, they can be installed there, and everyone can use them for relaxation (Krutin, 2016).

All of the above-mentioned forms are used in elementary school. The most common forms of ICT training for high school students are: multimedia lectures; training lectures; multimedia seminars; interactive discussions (synchronous and asynchronous); psychological and pedagogical trainings; technology "round table"; method of concrete situations.

Research on the impact of ICT-based learning on the educational process in elementary schools conducted by various scientists around the world shows that various uses of information and communication technologies improve and expand the range of all aspects of learning. Scientists who have conducted these studies at various times (Clements, 2000; Connell, 1997; Cox, 1993; Moseley et al., 1999) argue that the effective use of ICT instruction places significant demands on teachers in terms of their knowledge and skills, as well as mastery of a variety of software products. Educators need this knowledge in order to be able to: choose how to integrate ICTs into instruction; determine in each educational situation the need for a particular information product relevant to a given learning goal; design tasks that provide appropriate opportunities; respond to students' information needs in the classroom; implement effective learning controls; and determine the type of ICTs used and their accessibility to students (Clements, 2000; Hoyles & Noss, 1992).

Murray's (1992) research showed that a certain portion of elementary school teachers, especially older teachers, are not familiar with ICT and have limited hands-on experience using it. The situation is further complicated by the fact that at the current stage of development of both educational and information technologies, teachers themselves, especially in the context of the reform "New Ukrainian School", are required not only to have practical competence in using a number of types of ICTs, but also to understand the processes of ICT.

Wood (2001) generally argues that some teachers incorrectly believe that today's students hardly need a teacher in ICT-supported lessons, and that students will learn to use computers on their own or learn from each other.

Given the above, we believe that information and communication learning is by far the most innovative method of receiving education, which, thanks to quality content, can take several forms to stimulate student memorization. At the same time, it requires more professional effort on the part of teachers for its quality mastering and constant work to further improve the acquired knowledge and skills.

Conclusions

The contribution of neuroscience in the development of modern primary education is increasing every year and is extremely effective and interesting. This trend is also conditioned by the needs of the information age, and its intensification leads to radical changes in traditional approaches

to learning, teaching and assessment of acquired knowledge. But this should not exclude all other concepts and ideas that are used in the educational process or can be applied. Also, elementary school teachers' use of neuro-pedagogical knowledge and techniques should not turn them into neuropsychologists, speech pathologists, and neurobiologists, but rather help them master the knowledge of how the brain processes information and what the cognitive and metacognitive processes involved in learning are (Kazachonak, 2020).

The authors found that there are six forms of individual neuro-didactic characteristics of individuals affecting the degree of their involvement in the educational process, namely: the individual lateral profile; features due to the article of the person (gender differences); type of temperament; type of sensory-perceptual organization (modality of internal experience); level of development of higher mental functions; correspondence between the neuropsychic features of the teacher and students.

In addition, the authors determined that the innovative neuro-pedagogical technologies that can be used in the formation of professional competence of primary teachers of the New Ukrainian school and improve their skills include: play tier, problem-oriented methodology, team-oriented methodology, project method, portfolio method, information and communication technologies. Also, the article investigated the specifics of their application and justified the feasibility of their use in the educational process of elementary school in the context of the reform "New Ukrainian School".

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