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NEUROPEDAGOGY AS A FOUNDATION FOR INCREASING THE EFFECTIVENESS OF THE EDUCATIONAL PROCESS

MADINA SHUKUROVA

Lecturer at the Department of Methods of Teaching Russian Language and Literature in Foreign Language Groups
Chirchik State Pedagogical University
Chirchik, Uzbekistan
E-mail: madina.shukurova.82@mail.ru

ABOUT ARTICLE

Abstract: The article describes the use of neuropedagogy as a foundation for increasing the efficiency of the educational process. The subject of the research is the use of neuropedagogy as a foundation for enhancing the effectiveness of the educational process. The structural basis of the study includes factors affecting the assimilation of materials by students. The research hypothesis suggests that an educational concept where students have extended freedom to express their requirements and choose the level of educational materials transforms the traditional education system. The author concludes that the learning change model can also be used in the educational process to improve its effectiveness according to the principles of neuropedagogy.

INTRODUCTION

The individualization of the learning process as a technique is entirely feasible without the use of computers. The main tools employed within this concept are approaches aimed at considering personal qualities and individuality of students. However, it is precisely thanks to the digital age and technological development that it has become possible to significantly expand the boundaries of the individual approach in education. This expansion has revealed a number of advantages that have become available thanks to modern technological solutions. In this list, the following points should be noted:

- Simplification of the teacher's work due to automation;

- The option of distance learning;

- Interactive teaching methods;

- The ability to instantly monitor students' progress.

Thus, the personalization of learning does not so much decrease as it transforms the role of the teacher, emphasizing an individual approach to each student. In this new role, the teacher acts as a mentor who not only imparts knowledge but also helps students identify and develop their own unique abilities and interests. This requires teachers to be flexible and ready to constantly update their methods of working with students, which in turn can lead to the development of new pedagogical strategies.

In this new educational space, the teacher acts as a mentor who helps students understand information and apply it in practice. He creates conditions in which each student can demonstrate their strengths and work on their weaknesses. Such an approach allows students not only to assimilate knowledge but also to develop critical thinking, learn to independently find and analyze information, which is an integral part of a successful career in the modern world.

LITERATURE REVIEW

To support students in achieving their educational goals, it is important for educators to familiarize themselves with a variety of educational materials and adapt them to the knowledge level of each student. A key aspect of the individual approach to education is assessing the student's level of knowledge. As a result, teachers should allow students to determine their own grades, as this aligns with the principles of individualized learning. This approach teaches students to independently evaluate their achievements and the efforts they put forth in life. For the successful implementation of this approach, an assessment system needs to be established. For this, the educator must clearly define criteria and provide samples for students to refer to when assessing their own progress.

In the traditional education system, we are accustomed to the subtractive method of assessment, where the teacher deducts points for each mistake. However, there is an alternative approach – the additive method. In this, the teacher adds points for each correct answer. This approach changes the perception of grades and encourages additional motivation for the student to learn. Individualization of learning is impossible without considering the unique characteristics of each student. Identifying a student's abilities is a key factor in forming an individual learning path.

METHODOLOGY

Currently, the field of neuropedagogy becomes particularly important in the modern educational sphere. Each year, mass media increasingly discuss the end of the era of the traditional classroom: soon, school desks and boards will become redundant, heralding the era of digital workplaces, "flipped" lessons, social learning, etc. However, studies show that even the most advanced educational technologies will not replace the classic school classroom but will complement it instead. Thanks to the latest innovations in education, teachers and students gain broader access to quality resources and effective teaching methods. In the modern world, the ability to adapt flexibly to changes is crucial. Today's reality is filled with variety and dynamism. People constantly face uncertainty, challenges, and various situations. How we make decisions? and How successful and effective they depend on our readiness for change?

According to UNESCO documents, new digital skills are being highlighted in the field of education: creativity, critical thinking, collaboration, and communication [1]. There is currently active interaction between pedagogy and neuroscience. A new direction, neuropedagogy, aims to determine how the effectiveness of learning can be enhanced using the latest achievements in the study of the human brain.

Neuropedagogy relies on traditional principles of pedagogy, psychology, neurology, and cybernetics, reflecting an individual approach to education. It focuses on sensory pedagogy, exploring ways to affect the sensory organs of the student (vision, smell, hearing, touch) and their emotional state to improve learnability and develop self-regulation skills during the learning process. According to modern scientists, education that does not consider neuropsychological principles is incomplete [2].

According to experts in the field of neuroscience, the main reason for the "lagging", "failure", and even "underdevelopment" in normally gifted and healthy students is the modern education system, which is not brain-friendly. For maximum effectiveness in the educational process, educators need to have an understanding of how the human brain is structured, how it remembers, processes, retains, and reproduces information. Modern research suggests considering the brain and the human central nervous system as a complex of various neural networks, each trained differently and having its unique structure [3]. In the approach based on neuropedagogy, the upbringing, education, and teaching of children differ only in the set of information. This can be explained as follows:

- Teaching a natural neural network involves presenting known data with clearly defined state function values of the network;

- Upbringing is the process of training neural networks on all external information coming from outside;

- Education involves teaching children specific information sets with the aim of acquiring knowledge, skills, and abilities.

At the same time, the structure of the brain is not constant. Research using computer, magnetic resonance, and positron emission tomography has shown that the brain changes its structure depending on the activity being performed, rearranging neural connections for the most efficient performance of the current task. Scientists call this property of the brain neuroplasticity. Research in the field of brain plasticity demonstrates that a key factor in successful learning is the behavior of the student – their eagerness and desire to learn.

RESEARCH RESULTS

At the current stage, the improvement of teaching methods in the context of using digital technologies in the development of the educational process is becoming increasingly important. The symbiosis of traditional teaching methods and advanced technologies has laid the foundation for the emergence of a direction in pedagogical science known as neuropedagogy. Among the organizational and pedagogical factors contributing to the improvement of the learning process using neural networks, the following can be highlighted:

- Recognition and identification of key characteristics of the model being taught;

- Clear structuring and creation of an ontology of the subject area.

The factors affecting the assimilation of materials by students can be classified as follows:

- Motivation (including interest in learning, desire for knowledge, self-development, career aspects);

- Intellectual abilities (taking into account the level of IQ, special talents, and social intelligence);

- Psychological characteristics (including personality type, level of creativity, teamwork skills);

- Physical factors (considering living conditions, health status, and other aspects) [4].

The study of the aforementioned factors allows for a comprehensive analysis of the student's personality, identifying the most significant psychological characteristics that influence the success of learning [5]. It is necessary to develop a method for the systemic assessment of each of these factors, which collectively forms a structure that determines the overall mentality of students. Based on this system, a neural network is built for analyzing and accounting for the psychological characteristics of the students [6]. Besides determining the readiness level of students, the neural network needs the ability to assess the quality and

complexity of the educational material being learned. By comparing these indicators, it is possible to maintain the right balance between the complexity of the educational material and the students' level of preparedness. Additionally, the application of ontology in the subject area helps to address the issue of identifying areas for correction, necessary for implementing adaptive learning management based on individual student outcomes.

The methodology for measuring the complexity of an educational module is based on calculating the complexity of the module's direct concept as the sum of magnitudes. The success of the teacher primarily depends on changing the student's attitude towards the learning process, arousing interests, and acquiring abilities in the form of knowledge and skills.

This perspective was also held by K.D. Ushinsky, who argued for the need for a certain change in the traditional view of the interdependence of teaching and upbringing. "Every student has the right and opportunity to independently determine at what level to study the material" [7]. He believes that good education should follow a balanced path, enriching a person with knowledge while at the same time teaching them to use these riches. Since it interacts with a growing person whose psychological needs continue to expand, education should not only satisfy current needs but also prepare for the future [8]. Pay attention to the phrase "There are reasons for this".

DISCUSSION

Thus, these judgments lead to the conclusion that the concept of learning, where students have expanded freedom to set their own requirements and choose the level of educational materials, contradicts the traditional system of education. At the same time, this does not prevent the current credit system of education, which includes a number of adapted learning elements, from being successfully applied in teaching students at universities [9]. Stanislas Dehaene formulated recommendations from neurologists to improve the educational process in the form of four key principles [10]. They are the following:

The first principle is an emphasis on attention. Special importance is placed on paying attention in the learning process.

The second principle is active interaction. "Effective learning implies a departure from passivity: studying with enthusiasm, curiosity, actively forming hypotheses and their practical testing" [11]. This approach, in a sense, casts doubt on the assertion that the learning process is easy. "Without attention, without deep reflection, lessons leave only superficial traces in the brain." "The best pedagogy aims to make students active, while carefully guiding the teacher in studying structural chemistry with a clear and consistent methodology, starting from the basics, testing skills, and forming a pyramid of meaning in their understanding [12].

The third principle is feedback on errors. We learn from our mistakes. An error becomes a stimulus for activating attention. It generates interest and initiates the cognitive process of learning and analysis. However, mistakes also represent a powerful tool in the learning process. To learn from one's mistakes, constructive feedback is necessary.

The fourth principle is consolidation. This is the transition from slow, conscious thinking, which does not require effort, to fast, unconscious, automatic thinking. The main thing in this process is to give the student the opportunity to move from conscious work to unconscious. Those who act intuitively free up working memory, which is limited and plays a key role in expanding learning opportunities. The formulated recommendations are based on the key principles of neuropedagogy [13]: the human brain is a "parallel processor," capable of performing several functions simultaneously. However, both brain overload and "working brain" overload can negatively affect its development.

In modern educational trends, there is a shift in the mission of educational institutions: they are no longer the sole providers of quality information and knowledge. This is largely due to advancements in information and communication technologies. In this context, UNESCO focuses its attention on the fundamental factors of using credit technology in education [14]. One of these factors is the development of emotion recognition systems for the rapid detection of changes in the quality of classes, which is actively being implemented in developed countries [15].

In the field of education, the Internet of Things (IoT) brings significant changes to the learning process. The future possibilities of using IoT in education are practically unlimited, and this will have a serious impact. As online interactions between people and devices increase, society accumulates more and more digital data. The term "big data" means that the volume of information has reached such scales that it actually represents a qualitative shift. This shift requires changes in thinking and the emergence of a new type of human and technological infrastructure. Since communication plays a key role in the process of learning and acquiring knowledge and skills among students, we are witnessing a transformation of existing learning tools. In this context, teachers need to learn to work in new conditions.

CONCLUSION

Thus, modern students require certain digital skills, including digital literacy, programming abilities, teamwork, project activities, information analysis, synthesis of solutions, and their subsequent application in real-life situations. For the effective development of these digital skills, it is necessary to actively involve teachers and provide them with modern information and communication technologies (ICT). The main tasks of the teacher are a)

creating optimal conditions for learning and b) identifying and developing the individual abilities of each student. Today, the term "techno-social engineering" describes the process of combining technologies and social forces to influence our thinking, perception, and behavior.

Therefore, it is necessary to strengthen the mental and behavioral autonomy of those who face new technological opportunities based on data analysis and trends in decision-making automation [16]. Media and information literacy are considered here as a comprehensive concept, first proposed by UNESCO in 2007. This concept encompasses all skills related to literacy and media literacy. Recognizing the importance of information literacy, including digital or technical literacy, especially in the context of identifying and minimizing the negative aspects of algorithms in digital services, becomes key in the educational process to enhance its effectiveness according to the principles of neuropedagogy.

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