

NEUROPEDAGOGICAL CONTENT OF EXISTING AND EXPERIMENTAL METHODS IN LINGUISTICS

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Abstract

This article analyzes the neuropedagogical content of existing and experimental methods used in neurolinguistics. It highlights the significance of neurophysiological, psycholinguistic, and behavioral experimental methods in the process of language learning and reveals their didactic potential in educational practice. In addition, the study substantiates the role of the principle of neuroplasticity, the impact of bilingualism and multilingualism on cognitive development, and the importance of experimental methods in the diagnosis and correction of speech disorders.

Keywords: Neurolinguistics, neuropedagogy, experimental methods, neurophysiological research, psycholinguistics, neuroplasticity, language teaching, cognitive processes, digital education, bilingualism, multilingualism, didactic strategies.

Introduction

Annotatsiya

Mazkur maqolada neyrotilshunoslikda qoʻllanilayotgan mavjud va eksperimental metodikalarning neuropedagogik mazmuni tahlil qilingan. Tilni oʻrganish jarayonida neyrofiziologik, psixolingvistik hamda xulq-atvor eksperimental metodlarining ahamiyati yoritilib, ularning taʼlim jarayonidagi didaktik imkoniyatlari ochib berilgan. Shuningdek, neyroplastiklik tamoyili, ikki va koʻp tillilikning kognitiv rivojlanishga taʼsiri, nutq buzilishlarini tashxislash va korrektsiyalashda eksperimental metodlarning oʻrni asoslangan.

Kalit so‘zlar: neyrotilshunoslik, neyropedagogika, eksperimental metodlar, neyrofiziologik tadqiqotlar, psixolingvistika, neyroplastiklik, tilni o‘qitish, kognitiv jarayonlar, raqamli ta’lim, ikki tillilik, ko‘p tillilik, didaktik strategiyalar.

Аннотация

В данной статье проанализировано нейропедагогическое содержание существующих и экспериментальных методик, применяемых в нейролингвистике. Раскрыто значение нейрофизиологических, психолингвистических и поведенческих экспериментальных методов в процессе изучения языка, а также их дидактические возможности в образовательном процессе. Кроме того, обоснована роль принципа нейропластичности, влияние билингвизма и полилингвизма на когнитивное развитие, а также значение экспериментальных методов в диагностике и коррекции речевых нарушений.

Ключевые слова: нейролингвистика, нейропедагогика, экспериментальные методы, нейрофизиологические исследования, психолингвистика, нейропластичность, обучение языку, когнитивные процессы, цифровое образование, билингвизм, полилингвизм, дидактические стратегии.

Neurolinguistics is an interdisciplinary field that integrates linguistics, pedagogy, neurobiology, and psycholinguistics. It encompasses a variety of experimental techniques within the neuropedagogical framework for investigating the complex mechanisms underlying language acquisition and processing. Furthermore, experimental studies aimed at improving language proficiency and communicative skills can be conducted not only in educational institutions but also in other learning environments.

Experimental methods in neurolinguistics have been developed to identify the patterns underlying human behavioral activity; however, their application in the field of neuropedagogy remains relatively limited [6]. These methods contribute to optimizing the investigation of neuropedagogical phenomena and provide a scientific basis for improving educational practices.

Educational tools play a significant role in creating favorable pedagogical conditions for self-determination, self-development, and the holistic formation of a child's personality. The issue of educational tools has been examined from various perspectives in both traditional pedagogy and learner-centered educational approaches. In traditional pedagogy, educational tools are primarily regarded as instructional methods (Yu. K. Babansky, N. M. Boldyrev, V. M. Korotov, S. Ya. Batishev, I. S. Marenko). In contrast, learner-centered pedagogy incorporates a wider range of educational tools, including means for developing reflective thinking (V. A. Karakovsky, L. I. Novikova, N. L. Selivanova, E. H. Sokolova); pedagogical support tools (O. S. Gazman, H. N. Mikhailova, S. D. Polyakov, S. M. Yusfin); tools designed to create conditions for developing learners' personal attitudes toward values (S. V. Kulnevich); instruments for enhancing students' subjective experience (A. A. Pligin); and methods for fostering teachers' technological culture and professional self-development (I. A. Kolesnikova, N. Sh. Chinkina), among others.

According to Professor N. A. Shermukhamedova, "The social function of science implies the use of scientific methods and research findings for the development of large-scale social and economic plans. Science manifests itself as a social force in addressing the global challenges of our time, such as the depletion of natural resources, atmospheric pollution, and the assessment of environmental risks. In fulfilling this function, science becomes closely connected with social governance. The growing influence of society on science cannot be explained solely by the fact that science is obliged to fulfill a 'social order'" [2].

One of the principal groups of research methods comprises neurophysiological approaches, which involve recording brain activity during the performance of language-related tasks. These methods make it possible to identify the specific brain regions activated during speech perception, comprehension, and production. From a neuropedagogical perspective, such findings help explain the cognitive processes underlying successful language learning and identify the factors that may hinder this process.

Behavioral experimental methods aimed at measuring reaction time, task accuracy, and the nature of errors also occupy an important place in neurolinguistic research. These methods enable researchers to examine language-processing mechanisms, including word recognition speed, syntactic processing,

and the influence of contextual information on language comprehension. The obtained data serve as a basis for developing didactic strategies that take learners' actual cognitive abilities into account.

An essential component of the neuropedagogical framework is its orientation toward the principle of neuroplasticity. Experimental studies demonstrate that regular language practice, various forms of instructional support, and learners' active participation contribute to the formation of stable neural connections. These findings constitute the scientific foundation for intensive and adaptive language teaching methods [4].

Particular attention is paid to studies on bilingualism and multilingualism. Research findings indicate that proficiency in multiple languages positively influences cognitive functions such as attention, cognitive flexibility, and working memory. In neuropedagogy, these findings are used to justify early foreign language instruction and to develop educational programs that promote the balanced development of multiple language systems.

Techniques used in the study of speech disorders are equally important. Experimental approaches make it possible to identify specific deficits in linguistic information processing that are essential for diagnosing conditions such as aphasia (partial or complete impairment of previously acquired speech), dyslexia (a neurobiological disorder affecting reading and writing skills), and dysgraphia (a specific partial impairment of writing ability). Based on these findings, corrective educational programs can be designed with consideration of learners' neurophysiological characteristics.

From a didactic perspective, the neuropedagogical significance of experimental methods lies in their ability to provide a scientific basis for selecting effective teaching strategies. For example, research demonstrates that the active use of contextual learning, systematic repetition, and multimodal presentation of information (including auditory, visual, and kinesthetic elements) significantly enhances language acquisition. These principles form the foundation of contemporary educational technologies.

The integration of digital technologies with experimental methods represents another important area of development. Modern digital tools enable the simulation of language-learning environments, the analysis of learners' behavior, and the real-time adaptation of instructional materials. Such innovations create

favorable conditions for the implementation of personalized, data-driven education.

Despite its considerable potential, the application of experimental methods in neuropedagogy is associated with several limitations. First, the findings obtained from laboratory studies cannot always be directly transferred to real educational settings. Second, the interpretation of neurophysiological data requires a high level of professional expertise and is therefore susceptible to potential errors. Third, there is a risk of excessive emphasis on technological aspects at the expense of the humanistic goals of education.

Furthermore, ethical considerations remain of paramount importance. The use of data related to students' brain activity requires strict adherence to the principles of confidentiality and voluntary participation. It is equally important to ensure learners' psychological well-being and to avoid experimental procedures that may cause stress or discomfort.

In conclusion, the neuropedagogical significance of experimental techniques employed in neurolinguistics lies in their ability to provide a scientific foundation for the development of effective educational strategies. These methods contribute to a deeper understanding of the mechanisms underlying language acquisition, facilitate the identification of factors influencing successful language learning, and create favorable conditions for implementing individualized and evidence-based approaches to education. Future development in this field will depend on strengthening interdisciplinary collaboration, improving research methodologies, and promoting the broader integration of scientific findings into educational practice.

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