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An Innovative Approach to Primary Education: Teaching Text Comprehension Through Neuro-Pedagogical Strategies

Sotivoldiyeva Sarvinoz Khahramon Qizi

Lecturer at the Department of Humanities and Pedagogy, Turan International University

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*Correspondence: Sotivoldiyeva Sarvinoz Khahramon Qizi
Email:
sarvinozsotivoldiyeva920@gmail.com

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Abstract: This article presents the results of a scientific study aimed at enhancing primary school students' reading and text comprehension skills through the application of neuro-pedagogical strategies. The research was conducted using control and experimental groups, where the effectiveness of traditional methods and neuro-pedagogical approaches was compared. The implementation of strategies such as semantic analysis, visual mapping, and clustering in the experimental group significantly improved students' reading speed, comprehension ability, and motivation. The study emphasizes the activation of cognitive processes and the harmonization of left and right brain hemispheres to improve information retention and understanding. Statistical analysis confirmed the effectiveness of these innovative methods, and the results provide a strong foundation for reforming literacy instruction in Uzbekistan's primary education system. The article concludes with recommendations for wider implementation and future integration with international educational practices.

Keywords: Neuro-Pedagogy, Text Comprehension, Primary Education, Cognitive Development, Visual Mapping, Semantic Analysis, Reading Strategies, Innovative Methodology, Hemispheric Activation, Learner Motivation.

Introduction

Today, the formation of reading skills and the development of the ability of students to fully understand the text at all stages of education, especially in primary education, is one of the main goals of the educational process. Because this ability is an important factor in the formation of not only the intellectual potential of children, but also critical thinking, analysis, problem solving skills. Research shows that for elementary students, building on neuropedagogical principles is of particular importance when applying effective strategies for reading and understanding the text. In particular, a 2021 study by the U.S. National Center for Educational Statistics (NCES) showed that about 60% of Primary School students have difficulty fully understanding the text. Also, neurophysiological research is emphasizing the need to employ specific strategies, such as the "cognitive load reduction rule and interactive reading techniques", to ensure that the human brain is actively functioning in the reading process.

In modern education, technologies and new pedagogical methods are developing rapidly. This situation creates the need for further improvement of the students' process of understanding and mastering the text. Especially with the help of neuropedagogical approaches, it is possible to organize this process consciously and efficiently, resulting in an increase in the quality of Education. The relevance of the topic is precisely because these approaches not only take into account the individual level of assimilation of the student, but also show ways to make the teaching process more effective for teachers.

The development of reading and text comprehension skills of Primary School students is one of the important tasks of the educational system. In the development strategy of the New Uzbekistan for 2022-2026, the issue of improving the quality and efficiency of education is mentioned as a priority. In particular, at the stage of primary education, special attention is paid to the formation of the reading, understanding and analysis abilities of students.

Through this strategic approach, the aim is to deepen the level of thinking of students, develop independent learning skills and create a quality educational environment.

Methodology

The concept of reading is interpreted differently in pedagogical and psychological sources. Reading is a complex cognitive activity aimed at recognizing the units of words and sentences in a text, understanding their content, analyzing and making sense. Researcher F.In Smith's view, the reading process is defined as the process of extracting meaning from information given through printed or written signs. Venkateswaran, on the other hand , believes that "reading consists of three factors – that is, the interaction of basic knowledge, conceptual (understanding-related) abilities and effective learning strategies".

Currently, conscious teaching of the text and its understanding is one of the main tasks facing educators. Neuropedagogical knowledge comes to our aid in fulfilling this task full-fledged. At this point, the question arises, What is neuropedagogy itself?

Neuropedagogy (educational neurobiology) is a field of Applied neurobiology based on cognitive neuroscience, differential Psychophysiology, neuropsychological knowledge as well as the use of information about brain activity in the process of mastering various educational materials. This area aims to improve educational effectiveness by taking into account IPL (individual lateralization profile) compatibility of students and teachers in the educational process.

Although the need for the integration of pedagogy and neuroscience has been pushed forward for several decades, the practical formation of this direction dates mainly to the late 20th century. Advances in neuropsychology, neurobiology and cognitive science have brought about a new pedagogical approach, neuropedagogy, which serves to improve the effectiveness of the educational process.

In Russia, this scientific direction began to take shape in 1997-2000. During this period, V.A.Moskvin, N.V.Moskvina, V.D. Eremeeva, T.P.Xryzman the first scientific and methodological research in the field of neuropedagogy was carried out by researchers such as chryzman. Neuropedagogical theories in Russia, first of all, L.S.Vygotsky's theory of

cultural-historical development and A.R.Lurie took shape, relying on Ane's neuropsychological views.

According to the idea put forward by T.P. Khryzman, “neuro-pedagogy is considered a scientific-practical direction that is emerging in the modern education system and located at the intersection of several sciences. It emphasizes that, in order to effectively organize the learning process, it is necessary first of all to deeply study the condition of students’ nervous systems, how they differ neurophysiologically, and their psychological characteristics”. Through this approach, Khryzman proposes the development of educational technologies that are tailored to the individual and built according to their needs.

The development of neuro-pedagogy and neuropsychology makes it possible to identify a number of problems related to education. A person's lateral characteristics indicate the partial dominance of certain brain regions, which is associated with the existence of individual differences in the implementation of several mental processes: attention, memory, thinking, emotions, will, and others.

One of the important directions of neuro-pedagogy is the study of the compatibility between the individual characteristics of the teacher and the student.

Neuro-pedagogy helps the teacher to understand the student’s brain activity and adapt the teaching methodology accordingly. Prominent scientists from various countries have made significant contributions to its development. In particular, Kurt Fischer (USA) proposed the “Dynamic Skill Theory,” which shows that children's cognitive development takes shape step by step and proves that these stages are connected to neural systems.

According to him, knowledge is not formed instantly, but based on individual rhythm and neuronal maturation.

Likewise, Tracey Tokuhama-Espinosa substantiated neuro-pedagogy as an independent science in her concept of “Mind, Brain, and Education Science”. She interprets this field as a synthesis of three sciences: pedagogy, psychology, and neurobiology, and explained the organic interconnection between these disciplines through practical experience and scientific foundations.

In neuro-pedagogical research, the influence of emotions on learning activity holds particular importance. For example, in studies conducted by Mary Helen Immordino-Yang and Antonio Damasio, it was proven that emotionally rich materials for students strengthen memory and have a significant impact on the process of conscious understanding. This shows the necessity of paying attention not only to the cognitive, but also to the emotional-intellectual development of students.

Uzbek scientists have also conducted a number of studies in this field and developed their own approaches.

For example, M.A. Norboyeva confirmed the effectiveness of methods such as clustering technology and visual mapping in developing primary school students’ text comprehension abilities through practical experiments. orqali tasdiqladi. In her work, Norboyeva showed that by applying neuro-pedagogical principles, students' abilities to perform semantic analysis of texts, identify main ideas, and systematize them significantly improved.

Likewise, in the "Strategy for the Modernization of Education until 2026" approved by the Ministry of Public Education of the Republic of Uzbekistan, the issue of wide application of neuro-pedagogical principles in primary education has been raised. In this document, the necessity of implementing educational methods aimed at harmonizing the functioning of the left and right hemispheres of the brain in children, including "interactive reading technologies," is emphasized. Within the framework of implementing this strategy, the "Bilim Makoni" (Knowledge Space) project was carried out. Within this project, neuro-pedagogical approaches were tested in classroom settings, and it was achieved to increase students' interest in reading by 14 percent. This, in turn, practically proves the role of these approaches in increasing the effectiveness of education.

We present a set of neuro-pedagogical methods aimed at the conscious comprehension of texts:

1. *Hemispheric Integration Tasks* – These are graphic and semantic exercises that activate both the left and right hemispheres of the brain. The "Colorful Character Exercise" is included in this set of tasks. The main goal of this activity is to analyze the character traits of the literary figures (which activates the left hemisphere) and to express them visually (which activates the right hemisphere). Students choose the main character from the text, select colors that match the character's traits and behavior, and complete the assigned tasks. *(See Table 1.)*

Table 1. Step, Activity Description, and Pedagogical Objective

Step	Activity Description	Pedagogical Objective
Step 1	The text is read (a story, fairy tale or excerpt)	Getting to know the character, understanding the event
Step 2	Emotions are identified for each character	Emotional awareness and identification
Step 3	A color is chosen to match each emotion (e.g., joy = yellow)	Expressing emotion through color
Step 4	The student draws the character and colors it with the chosen color	Visual-motor coordination, creative expression
Step 5	The student writes a short sentence under the picture: "He/She was happy because…"	Verbal thinking, understanding cause-and-effect relationships

2. *Multimodal Reading Approach.* The multimodal reading approach provides students with the opportunity to perceive a text through multiple sensory channels by simultaneously engaging in reading, listening, and image-based analysis. In this methodological approach, the teacher presents an audio version of the literary text to be listened to twice.
   - The first listening activates students' skills in grasping the general content,
   - while the second listening serves to identify the main idea and the development of events.

   After listening, students are assigned the task of dividing the text into three semantic segments based on its content. Each part is then given an appropriate title chosen by the students. Based on the selected titles, students are tasked with drawing illustrations that represent the events described in the text. Following this, the story is

retold by the students based on their drawings. This method serves to holistically activate students' abilities in:

- auditory perception,
- semantic analysis,
- imaginative visualization,
- emotional-aesthetic thinking.

For example:

- The moment the little bird is brought in,
- The scene of creating a forest inside the cage,
- The bird's early morning singing.

3. *Associative maps* – helped to analyze the content of the text through structural modeling. The methodology of constructing an associative map serves to develop students' skills in semantic analysis, structural thinking, and visual understanding of the content of a text. Let us examine this method step by step and present an example in graphical form.
   Text: "The Gardener and the Sapling" (Based on a legend)
   After reading the text, the student completes the following task.
   Task 1: Construct an associative map.
   Students construct the map as follows:
   - Central concept: Gardener
   - Branching main points:
     - Child
     - Sapling
     - Rebuke
     - Realization of the mistake
     - Two saplings
     - Patience
   - Guiding questions to help illustrate their interconnections:

Table 2. Concept, Question, and Visual Representation (drawn by students)

Concept	Question	Visual Representation (drawn by students)
Child	Why did the gardener rebuke his child?	Picture of a child
Sapling	Why are the saplings important?	Drawing of two saplings
Rebuke	When and under what circumstances was the rebuke given?	Angry gardener illustration
Realization of the mistake	How did the gardener realize his mistake?	Gardener in deep thought
Two saplings	What was the outcome of the saplings?	One grown and one withered sapling drawing
Patience	How is patience expressed in this story?	Images of a clock, waiting posture, and a tree

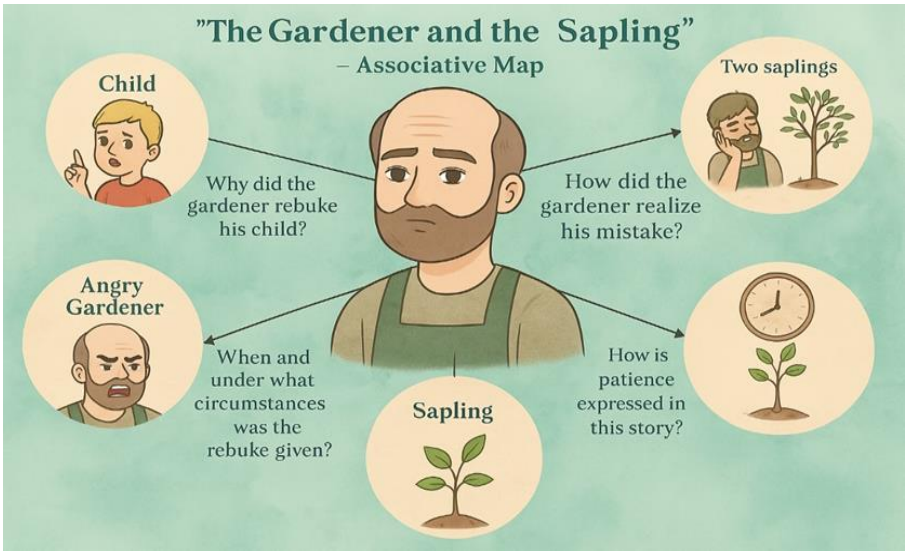

Figure 1. Gardener – central concept (main character)

The key concepts related to him are semantically connected ideas such as sapling, child, rebuke, patience, and realization of the mistake. For each branch, the student may draw a picture, write an explanation, or provide a real-life example.

"Continue the sentence" (a cognitively activating exercise) – aims to develop students' ability to sequentially recall the content of the text, form logical connections, enhance speech development, and strengthen attention focus.

Objective: To sequentially recall and analyze the content of a text.

Process:

- First, the teacher reads the text aloud.
- The first student begins by stating the opening sentence from the text.
- The next student continues using the phrase "then…".
- Following this sequence, students collectively summarize the text.

As a result, this activity activates the left hemisphere of the brain (verbal analysis) and the hippocampus (memory function). Students learn to remember based on context. Each child strives to logically connect their sentence to the previous one. In addition, students are encouraged to retell the text using their own vocabulary and to derive a conscious conclusion from the text.

Result and Discussion

The results of the study provided scientific justification for the effectiveness of neuro-pedagogical approaches in developing reading and text comprehension skills in primary school students. By comparing the initial and final test results of students in both control and experimental groups, the positive impact of neuro-pedagogical strategies was evaluated using statistical methods. Initially, students' ability to comprehend texts was analyzed. In the control group, the initial test results averaged 60%, with a slight increase to 63% in the final evaluation. In contrast, the experimental group began with an average of 62%, and after the implementation of neuro-pedagogical approaches, the final results improved significantly to 75% (*Table 1*). This significant increase confirms the effectiveness

of neuro-pedagogical methods—particularly interactive visualization and semantic analysis in enhancing comprehension skills.

Table 3. Changes in Text Comprehension Ability in Control and Experimental Groups

Group	Number of students	Initial result (%)	Final result (%)	Change (%)	Effectiveness of the approach
Control Group	50	60	63	+3	Limited impact of traditional methods
Experimental Group	50	62	75	+13	High effectiveness of neuro-pedagogical strategies

(The initial indicators reflect the students' baseline level of text comprehension, while the final indicators demonstrate the changes that occurred through the application of neuro-pedagogical approaches. In the control group, where traditional methods were used, the degree of improvement was limited. In contrast, the experimental group showed a significant positive outcome due to the implementation of neuro-pedagogical methods. The effectiveness of neuro-pedagogical strategies is confirmed by the 13% increase observed in the experimental group.)

The analysis of the research results confirmed the effectiveness of neuro-pedagogical approaches in developing reading and text comprehension skills among primary school students. The strategies applied in the experimental group led to noticeable improvements in students' reading speed, text comprehension ability, and motivation to read. These approaches are distinguished by their focus on the child's cognitive development processes and by their integration of the functions of both the left and right hemispheres of the brain. The moderate improvement observed in the control group can be attributed to the lack of application of neuro-pedagogical principles. While the traditional teaching methods used in this group focused primarily on delivering standard knowledge, the interactive and individualized approaches employed in the experimental group encouraged active participation in the reading process. In the experimental group, methods based on neuro-pedagogical strategies—particularly clustering, visual mapping, and semantic text analysis techniques—enhanced students' skills in working with texts. These methods enabled students to more easily grasp the content and to develop the ability to identify key ideas effectively.

Conclusion

The research results confirmed the high effectiveness of neuro-pedagogical approaches in teaching reading and text comprehension to primary school students. During the study, a comparative analysis of control and experimental group outcomes revealed that strategies based on neuro-pedagogical principles led to significant improvements in students' reading speed, text comprehension, and motivation to read. The methods applied to enhance students' comprehension —particularly visual mapping, clustering, and semantic analysis techniques created effective conditions for mastering the content of the text. Through step-by-step presentation of information and the use of interactive methods, students' attention and memory skills were managed efficiently, which in turn significantly improved their reading speed and comprehension skills. It is essential that these approaches

be further tested in broader classroom settings, integrated with national and international best practices, and their long-term impact on educational effectiveness thoroughly studied. These findings provide a solid foundation for introducing innovative methods of instruction in primary education within Uzbekistan's educational system.

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