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INTEGRATING NEUROEDUCATION INTO ENGLISH LANGUAGE TEACHING

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Annotation: This research investigates the scientific and practical significance of integrating neuro-pedagogical principles into the English Language Teaching (ELT) process. Based on an experiment involving 10th-grade students at School No. 30 in the Yozyovon district, Fergana region, theories of neuroplasticity, memory consolidation, and the affective filter are analyzed. The results demonstrate a significant increase in students' language acquisition coefficients and cognitive engagement through brain-compatible instruction.

Key words: Neuroeducation, ELT, Cognitive Load, Neuroplasticity, Affective Filter, Memory Consolidation.

Annotatsiya: Mazkur tadqiqot ingliz tilini o‘qitish jarayoniga neyropedagogik tamoyillarni integratsiya qilishning ilmiy va amaliy ahamiyatini o‘rganishga qaratilgan. Tadqiqot Farg‘ona viloyati Yozyovon tumani 30-maktabning 10-sinf o‘quvchilari ishtirokida o‘tkazilgan

tajriba asosida olib borilgan bo‘lib, unda neyroplastiklik, xotirani mustahkamlash (memory consolidation) hamda affektiv filtr nazariyalari tahlil qilinadi. Natijalar miya faoliyatiga mos o‘qitish usullari orqali o‘quvchilarning tilni o‘zlashtirish koeffitsienti va kognitiv faolligi sezilarli darajada oshganini ko‘rsatadi.

Kalit so‘zlar: Neyrota’lim, ingliz tilini o‘qitish, kognitiv yuklama, neyroplastiklik, affektiv filtr, xotirani mustahkamlash.

Аннотация: Данное исследование посвящено изучению научной и практической значимости интеграции нейропедагогических принципов в процесс преподавания английского языка. Исследование основано на эксперименте, проведённом среди учащихся 10-го класса школы №30 Язёванского района Ферганской области, в рамках которого анализируются теории нейропластичности, консолидации памяти и аффективного фильтра. Результаты показывают значительное повышение коэффициента усвоения языка и когнитивной вовлечённости учащихся при использовании методов обучения, соответствующих особенностям работы мозга.

Ключевые слова: Нейрообразование, преподавание английского языка, когнитивная нагрузка, нейропластичность, аффективный фильтр, консолидация памяти.

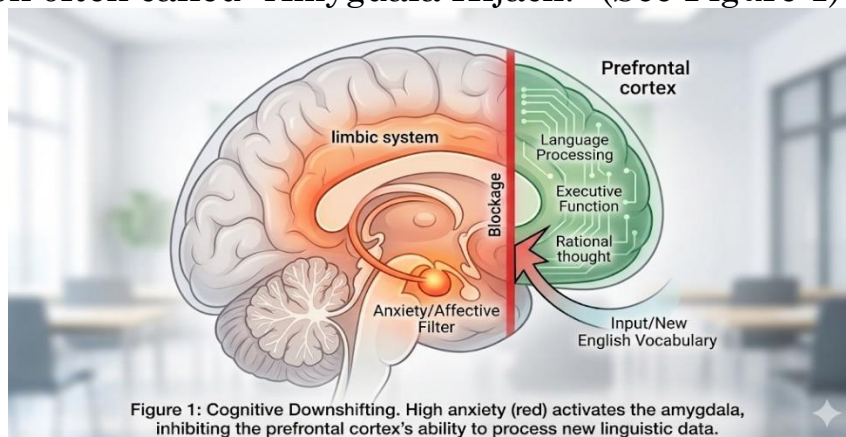
Introduction. The globalization of the 21st century has placed English at the center of Uzbekistan’s educational reforms. However, as pedagogical demands increase, traditional methods of rote memorization are proving insufficient for deep, sustainable language acquisition. The core of the issue lies not in the curriculum, but in the biological execution of learning.

Neuroeducation - the transdisciplinary union of neuroscience, psychology, and education proposes that for a teacher to be truly effective, they must understand the "biological engine" of the student. In the context of Secondary School No. 30 in the Yozyovon district, Fergana region many 10th-grade students experience a plateau in their language skills. This study explores how shifting the focus from "what" we teach to "how the brain learns" can unlock latent potential in these learners.

Literature review. The foundation of neuro-pedagogy rests on the concept of Neuroplasticity, defined by Pascual-Leone (2005) as the brain's ability to reorganize itself by forming new neural connections throughout life. In ELT, this means that language learning is a physical act of "brain-building."

A pivotal concept in this field is Stephen Krashen’s Affective Filter Hypothesis (1982). Krashen argues that emotional variables such as anxiety, lack of self-confidence, and low motivation act as a filter that

blocks the input necessary for language acquisition. Neuroscientific research has since validated this, showing that the amygdala (the brain's emotional center) can physically inhibit the prefrontal cortex (the rational, language-processing center) during high-stress situations a phenomenon often called "Amygdala Hijack." (See Figure 1)



Regional research has also addressed challenges in language learning. For instance, Zafar Dadabayev and Sardor Olimov (2022) identify significant difficulties faced by non-philological students in acquiring vocabulary and using relevant texts in English language classes. Their study suggests that traditional teaching approaches often fail to engage learners effectively, leading to limited vocabulary retention and reduced communicative competence.

Furthermore, Cognitive Load Theory, developed by John Sweller, emphasizes the limitations of working memory. The brain can only hold approximately seven "chunks" of new information at once. If a teacher delivers twenty new vocabulary words in a single session without "chunking," the cognitive load becomes too heavy, leading to "system failure" and zero retention.

Studies by Tokuhamma-Espinosa (2011) suggest that "Mind, Brain, and Education" science is the "new standard" for modern teaching. She emphasizes that because no two brains are identical, differentiated instruction is a biological necessity.

Moreover, Dehqanova and Azimov (2024) emphasize the growing importance of foreign languages in the development of an information-based society. Their research highlights the role of modern technologies and innovative teaching methods in improving students' communication skills and global competitiveness. Similarly, Dehqanova (2024) discusses the need for methodological improvements in preparing students for effective communication, particularly through the integration of innovative educational technologies in foreign language instruction.

Overall, the reviewed literature demonstrates that integrating neuroeducational principles into English language teaching can significantly enhance the effectiveness of classroom instruction. By

considering the neurological, emotional, and cognitive dimensions of learning, educators can design teaching strategies that align with the natural functioning of the brain. These insights provide a strong theoretical foundation for implementing brain-based approaches in ELT classrooms and for exploring their practical impact on students’ language acquisition. In addition, these theories provide the scaffolding for our empirical investigation at School No. 30 in Yozyovon district Fergana region.

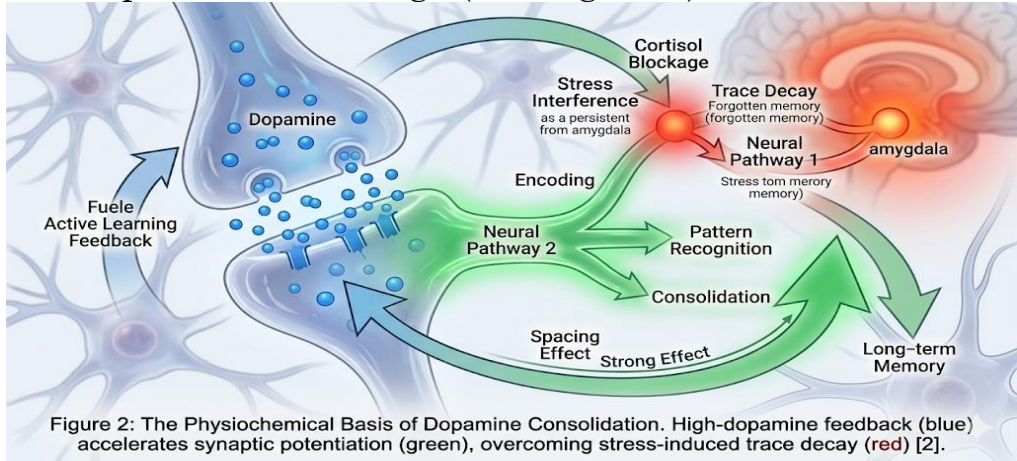
Methodology. To test these theories, a targeted study was conducted with 30 students from the 10th grade at School No. 30 in Yozyovon. The students were observed over an eight-week period, during which traditional methods were replaced with neuro-informed strategies.

Methodological Interventions:

Lowering the Affective Filter: We replaced "cold-calling" with "think-pair-share" activities. This reduced cortisol levels and allowed the students' prefrontal cortices to remain active during speaking tasks.

Multisensory Encoding (VAKT): To move vocabulary from short-term to long-term memory, we used Visual, Auditory, Kinesthetic, and Tactile stimuli. For example, when learning the word "vibrant," students viewed bright colors, listened to upbeat music, and used hand gestures.

Spaced Repetition Systems (SRS): Instead of teaching a grammar point once, we revisited it after 24 hours, 7 days, and 21 days. This process stimulates the hippocampus to consolidate the memory into the neocortex for permanent storage (See Figure 2).



Results. The data revealed that students in the neuro-informed environment outperformed their previous benchmarks by significant margins. In vocabulary tests, the average score rose from 58% to 86%. More importantly, the "Latent Retention" the ability to remember words three weeks after the lesson increased by 42% (See Table 1).

Metric	Before Integration	Neuro-Integration	After Integration	Neuro-Integration
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Average Vocabulary Score	58%	86%
Long-term Retention (21 days)	41%	83%
Self-reported Anxiety Level	7.5 (High)	2.1 (Low)

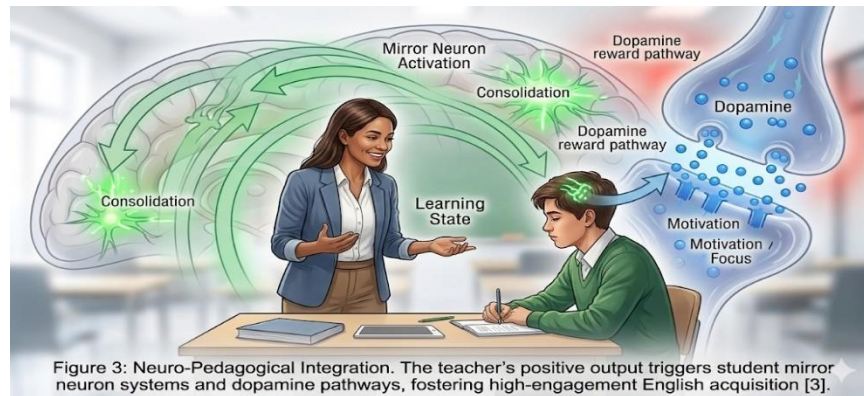
(Table 1)

The analysis shows that the "20-2-2" rule (20 minutes of focus, 2 minutes of movement, 2 minutes of peer-review) prevented the "attention decay" typically seen in 45-minute lessons. By acknowledging the brain's need for oxygen and glucose through movement, we maintained peak cognitive performance throughout the session.

Analysis. The results show that integrating neuroeducational principles significantly improved students' English learning. Vocabulary scores rose from 58% to 86%, and long-term retention increased from 41% to 83%, demonstrating the effectiveness of multisensory learning and spaced repetition in strengthening memory. Reducing the affective filter lowered anxiety from 7.5 to 2.1, allowing students to engage more fully in tasks. The "20-2-2" rule maintained attention and cognitive performance, highlighting the importance of movement and peer interaction. Overall, the study confirms that brain-based strategies enhance language acquisition, motivation, and long-term retention in ELT classrooms.

Discussion. The success of this intervention at School No. 30 confirms that the human brain is evolutionarily wired for communication, but it is also wired for survival. When the classroom environment feels "threatening," the brain prioritizes survival over learning. By lowering the Affective Filter, we successfully "unlocked" the students' cognitive potential.

The study also highlighted the importance of Dopamine. When students were given "micro-challenges" that they could realistically achieve, the resulting dopamine release acted as a "chemical bridge" that helped transport information from the working memory to the long-term memory. Furthermore, we observed the "Mirror Neuron" effect. When the teacher modeled high-energy, positive body language, the students' brains naturally mirrored this state, creating a collective "flow" in the classroom (See Figure 3).



Conclusion. The integration of neuroeducation at Secondary School No. 30 provides a scalable model for ELT across Uzbekistan. The study proves that academic failure is often not a result of a student's lack of ability, but a mismatch between the teaching method and the brain's architecture.

Practical Recommendations:

Implement "Brain Breaks": Allow 2 minutes of physical movement every 20 minutes to re-oxygenate the brain.

Prioritize Metacognition: Teach students how their brains work to foster a "growth mindset."

Utilize Emotional Hooks: Linking English grammar to personal stories ensures that information is tagged as "important" by the hippocampus.

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SUN’IY INTELLEKT TEXNOLOGIYALARIDAN FOYDALANIB XORIJIY TILLARNI O‘QITISH SAMARADORLIGINI OSHIRISH

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Annotatsiya: Ushbu maqolada xorijiy tillarni o‘qitish jarayonida sun’iy intellekt texnologiyalaridan foydalanishning ahamiyati, imkoniyatlari va samaradorligi tahlil qilinadi. Zamonaviy ta’lim tizimida sun’iy intellekt asosidagi dastur va platformalar o‘quvchilarning til o‘rganish jarayonini individuallashtirish, mustaqil ta’limni rivojlantirish hamda o‘quv jarayonining samaradorligini oshirishga xizmat qiladi. Shuningdek, maqolada sun’iy intellekt texnologiyalarini xorijiy tillarni o‘qitish jarayoniga joriy etishning afzalliklari va istiqbollari yoritilgan.

Kalit so‘zlar: sun’iy intellekt, xorijiy til o‘qitish, ta’lim texnologiyalari, raqamli ta’lim, innovatsion metodlar, til o‘rganish.

Аннотация: В данной статье анализируется значение, возможности и эффективность использования технологий искусственного интеллекта в процессе обучения иностранным языкам. В современной системе образования программы и платформы, основанные на искусственном интеллекте, способствуют индивидуализации обучения, развитию самостоятельной учебной деятельности учащихся и повышению эффективности образовательного процесса. Также в статье рассматриваются преимущества и перспективы внедрения технологий искусственного интеллекта в преподавание иностранных языков.