Neuroscience and Teaching: From Cognitive Models to Inclusive Pedagogical Practices

Sacristano A.
Pedagogist
Adjunct Professor of Special Pedagogy
Support Course Department
University of Salerno
Via Giovanni Paolo II, 132 - 84084 Fisciano (SA)

Abstract

Student motivation and engagement are key factors for effective and lasting learning. Neuroscience shows that reward mechanisms, mediated by dopamine, influence the desire to learn, while educational psychology provides theoretical models useful for instructional design. The Self-Determination Theory (Deci & Ryan, 1985) highlights the role of autonomy, competence, and relatedness in intrinsic motivation, while the theory of learning goals (Dweck, 2006) distinguishes between a fixed and growth mindset, with significant implications for teaching. Strategies such as gamification, cooperative learning, and motivational feedback enhance school engagement.
At the same time, inclusive teaching based on neuroscience supports the learning of students with learning disabilities (DSA), ADHD, and special educational needs (BES) by adopting flexible and evidence-based methodologies. The Universal Design for Learning (UDL) model and assistive technologies enable personalized instruction, reducing cognitive barriers. The integration of neuroscience, pedagogy, and educational technologies is essential for designing accessible and motivating learning environments. Teacher training should include neuroeducational knowledge to improve classroom management and school inclusion. A multidisciplinary approach is crucial for developing innovative teaching strategies, enhancing instructional effectiveness, and promoting academic success for all students.

Kejwords: educational neuroscience, inclusive teaching, universal design for learning (UDL), personalized learning.

I. Introduction

In recent years, the integration of neuroscience with the science of education has fostered the development of a new pedagogical paradigm based on empirical evidence (Tokuhama-Espinosa, 2019, p. 3). This approach fits within the broader context of evidence-based education, which aims to improve teaching practices through the systematic application of verifiable scientific findings (Slavin, 2020, p. 215). The main objective is to translate knowledge about brain function into effective educational strategies capable of optimizing learning processes and adapting to the diverse characteristics of students (Ansari & Coch, 2006, p. 146).
Neuroscientific research has demonstrated that learning is a dynamic and multimodal process, influenced by cognitive, emotional, and social variables (Immordino-Yang & Damasio, 2007, p. 4). The theory of brain plasticity, for instance, has shown that the brain can reorganize and adapt in response to environmental stimuli and experience, which implies the need for flexible and adaptive teaching methodologies (Draganski et al., 2004, p. 311). Furthermore, recent studies have confirmed that meaningful learning depends on the simultaneous activation of different brain areas, including the prefrontal cortex for executive functions, the hippocampus for memory, and the limbic system for emotional regulation (Sousa, 2017, p. 98).
The current educational landscape places increasing emphasis on the adoption of scientifically validated teaching strategies to overcome practices based on intuitions unsupported by empirical data (Howard-Jones, 2014, p. 42). In particular, some neuromyths—such as the presumed existence of distinct "learning styles" (visual, auditory, kinesthetic)—have been debunked by neuroscientific research, which instead highlights the importance of multimodal approaches to enhance learning (Pashler et al., 2008, p. 116). At the same time, the effectiveness of techniques such as retrieval practice and spaced learning has been widely documented in improving long-term memory and reducing cognitive overload (Dunlosky et al., 2013, p. 34).
This article aims to analyze the contribution of neuroscience to instructional design, focusing on three key aspects: memory, attention, and motivation. Through a review of scientific literature and an examination of evidence-based teaching practices, it seeks to provide an updated framework on how neuroscientific knowledge can be translated into effective educational strategies, with particular attention to the inclusion of students with special educational needs (SEN).

II. Neuroscientific Foundations of Learning

Cognitive neuroscience has revolutionized the understanding of learning processes, demonstrating that the brain is a dynamic system in constant evolution (Ansari & Coch, 2006, p. 146). Recent studies have highlighted the role of brain plasticity, executive functions, and the neurobiological foundations of memory, attention, and motivation in knowledge construction and adaptation to educational contexts (Sousa, 2017, p. 34).
Brain plasticity, defined as the nervous system's ability to modify its structure and functionality in response to experience, represents one of the fundamental concepts of the neuroscience of learning (Draganski et al., 2004, p. 311). Research by Merzenich et al. (1983, p. 54) has shown that neural activity

changes based on received stimuli, an essential principle for instructional design that adapts learning environments.
Brain imaging studies indicate that learning modifies synaptic connections and promotes the creation of new neural networks, particularly in the prefrontal cortex, hippocampus, and basal ganglia (Zatorre et al., 2012, p. 560). These processes are especially evident in children and adolescents but continue throughout life, supporting the idea that learning is a continuous and not static phenomenon (Pascual-Leone et al., 2005, p. 374).
From a pedagogical perspective, brain plasticity implies the need for dynamic and flexible teaching methodologies that can adapt to students' individual needs. Strategies such as experiential learning and problem-based learning leverage the brain's ability to reorganize and consolidate new knowledge through meaningful experiences (Kolb, 2014, p. 97).
Executive functions, primarily located in the prefrontal cortex, are a set of cognitive abilities that enable the control and regulation of behavior and learning (Diamond, 2013, p. 136). These include:

- *Inhibition*: the ability to control automatic responses and focus on a task (Miyake et al., 2000, p. 57).
- *Working memory*: the ability to maintain and manipulate information for short periods (Baddeley, 2003, p. 829).
- *Cognitive flexibility*: the ability to adapt to new situations and change strategies in response to shifting stimuli (Blair & Raver, 2015, p. 713).

Executive functions are crucial for academic success as they regulate essential processes such as planning, problem-solving, and emotional regulation (Zelazo & Carlson, 2012, p. 355). Activities such as mindfulness training (Diamond & Lee, 2011, p. 963) and the use of active methodologies (e.g., cooperative learning and laboratory-based teaching) can enhance these abilities, fostering better attention control and self-regulation in students (Friedman et al., 2008, p. 62).
Memory is a complex process involving various brain structures. The hippocampus is crucial for encoding and consolidating long-term memory (Squire & Wixted, 2011, p. 100). According to Baddeley's working memory model (2000, p. 418), integrating new information with prior knowledge is facilitated by strategies such as retrieval practice and spaced repetition, both proven effective in improving long-term retention (Dunlosky et al., 2013, p. 35).
Attention is an essential mechanism for cognitive control and learning. Theoretical models (Broadbent, 1958, p. 382; Posner & Petersen, 1990, p. 30) suggest the existence of distinct attentional systems, including selective attention and sustained attention. The dorsolateral prefrontal cortex and the ascending reticular system regulate these processes, influencing students' ability to concentrate (Petersen & Posner, 2012, p. 74).
Research by Gazzaley & Rosen (2016, p. 215) indicates that excessive use of digital devices can fragment attention and reduce concentration capacity, suggesting the need to design learning environments that minimize distractions. Instructional techniques based on managing cognitive load (Sweller, 2011, p. 37) have proven effective in enhancing attention and reducing cognitive overload in students.
Motivation is primarily regulated by the dopaminergic system, involving the nucleus accumbens and the ventromedial prefrontal cortex (Schulz, 2015, p. 45). The Self-Determination Theory (Deci & Ryan, 2000, p. 68) distinguishes between intrinsic motivation (driven by personal interest) and extrinsic motivation (guided by external rewards), demonstrating that strategies such as game-based learning and cooperative learning can enhance motivation through gratification mechanisms and active engagement (Deterding et al., 2011, p. 142).
The neuroscientific foundations of learning provide a solid framework for rethinking teaching in a more effective and inclusive way. Brain plasticity justifies the importance of flexible approaches, while understanding executive functions and the neurobiological bases of memory, attention, and motivation allows for the development of evidence-based instructional strategies. The connection between neuroscience and pedagogy offers an innovative perspective to improve the quality of teaching and learning.

III. Memory and Teaching: Evidence-Based Strategies

Memory is a fundamental element in the learning process and represents one of the main areas of study in cognitive neuroscience applied to education. Understanding the mechanisms of encoding, storage, and retrieval of information enables the design of more effective educational environments and evidence-based teaching strategies (Dunlosky et al., 2013, p. 4). Various theoretical models have contributed to defining the functioning of memory, and their study has led to the experimentation of teaching techniques aimed at enhancing long-term retention and information retrieval.
One of the most influential models in understanding memory is the multi-component model by Baddeley and Hitch (1974, p. 47), which distinguishes three main components of working memory:

• The central executive, responsible for managing and coordinating information.
• The phonological loop, which processes and maintains verbal information.
• The visuospatial sketchpad, which processes visual and spatial information.

From a didactic perspective, this model suggests that strategies combining verbal and visual stimuli can improve learning and reduce cognitive load. Furthermore, since working memory has a limited capacity (Miller, 1956, p. 81), it is crucial to design teaching activities that facilitate the transition of information to long-term memory through repetition and consolidation (Sweller, 2011, p. 37).
Another significant contribution is Tulving's long-term memory model (1972, p. 387), which distinguishes between:

• Episodic memory: related to personally experienced events.
• Semantic memory: related to general knowledge and concepts.
• Procedural memory: associated with skills and automated competencies.

This classification implies that different strategies are more effective depending on the type of learning required. For example, learning by doing is more suitable for procedural memory, while techniques based on reorganizing information (e.g., concept maps) support semantic memory (Novak, 1990, p. 29).

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Neuroscientific and pedagogical research has identified several evidence-based strategies to improve information retention and long-term memory consolidation.
Two of the most effective strategies for memory consolidation are:

• Spaced Learning (distributed learning): involves spreading study or teaching sessions over longer time intervals instead of concentrating them in a single intensive session (cramming).

Experimental studies have shown that spaced review significantly improves information retention compared to massed study (Cepeda et al., 2006, p. 354). The educational application suggests scheduling periodic reviews of covered topics using techniques such as recurring quizzes or structured reviews.
• Retrieval Practice: is based on the idea that actively trying to recall information strengthens neural connections and improves long-term memory. Karpicke & Roediger (2008, p. 774) demonstrated that the simple act of retrieving information, through tests or questioning without consulting materials, produces superior learning outcomes compared to simple rereading. This method can be applied in the classroom through interactive quizzes, open-ended questions, and the use of digital or paper flashcards.
Dual Coding Theory, proposed by Paivio (1986, p. 57), argues that information is processed through two distinct cognitive systems:

• A verbal system for processing textual information.
• A non-verbal system (images, diagrams, charts) for visual processing.
Learning is more effective when information is presented in both modes because it allows for deeper processing and the creation of multiple memory retrieval pathways (Mayer, 2005, p. 219).

From a teaching perspective, dual coding can be applied through:

• The use of images and conceptual diagrams alongside written texts.
• Educational videos with subtitles, stimulating both the visual and verbal channels.
• Concept maps, which combine keywords and graphic representations to facilitate understanding and information retrieval.

David Ausubel (1968, p. 38) developed the concept of meaningful learning, which occurs when new information is integrated into the learner's pre-existing cognitive structure, creating stable and lasting connections.
According to Craik & Lockhart's depth of processing model (1972, p. 671), information is better retained when processed meaningfully rather than just passively repeated. Teaching strategies to encourage deep processing include:

• Using advance organizers: introducing a topic by connecting it to prior knowledge to facilitate the integration of new information.
• Problem-Based Learning (PBL): stimulating critical thinking through real-world problem-solving.
• Guided discussions and metacognitive questions: encouraging students to explain concepts in their own words and reflect on how they learn.

These strategies not only enhance learning but also make teaching more effective and inclusive, adapting to students' diverse cognitive styles:

•Structured lessons with distributed review over time (spaced learning).
• Active retrieval activities (retrieval practice), such as self-assessment tests.
• Use of combined visual and textual materials (dual coding)

Activities that promote deep processing, such as problem-solving and critical reflection.
An education based on neuroscientific evidence and the organized and cyclical application of these strategies in instructional design would allow for optimizing learning and knowledge retention

IV. Attention and Cognitive Management in Learning

Attention is a fundamental cognitive function for learning, as it determines the selection, processing, and retention of relevant information while filtering out irrelevant ones (Posner & Petersen, 1990, p. 25). However, students' attentional capacity is limited and subject to fluctuations influenced by cognitive, emotional, and environmental factors (Lavie, 2005, p. 339). Understanding attentional mechanisms allows for the design of teaching strategies aimed at improving students' focus, reducing cognitive load, and optimizing learning.
Several theoretical models have attempted to explain how attention works and its role in learning processes.
Broadbent's Attentional Filter Model (1958)
Donald Broadbent (1958, p. 42) proposed an attention model based on a selective filter that allows only a portion of the available sensory information to be processed. According to this theory, the cognitive system is comparable to a bottleneck where irrelevant information is excluded at an early stage of perception.
Didactic Implications:

• The presentation of information must be clear and well-structured to prevent attentional dispersion.
• The use of explicit cues (e.g., strategic pauses, highlighting key concepts) helps students focus on essential elements.

Posner's Attention Model (Posner & Petersen, 1990) Posner and Petersen (1990, p. 27) identified three main attentional systems:

1. Alerting system: regulates cognitive readiness.
2. Orienting system: directs attention to relevant stimuli.
3. Executive system**:** manages cognitive control and inhibits distractions.

Didactic Implications:
• Teaching activities should stimulate the orienting system with visual and interactive elements.
• Strategic breaks should be planned to renew students'

alertness levels.
• Executive control can be enhanced with activities that require self-regulation, such as self-assessment and problem-solving.

V. Didactic Strategies to Improve Attention and Reduce Cognitive Overload

One of the main issues in managing attention is cognitive overload, which occurs when the amount of information exceeds a student's processing capacity (Sweller, 1988, p. 257). Excessive stimuli and difficulties in organizing information can significantly reduce learning effectiveness. To counteract these effects, it is possible to adopt strategies that promote better attention management and working memory efficiency.

Multimodality and Active Learning

Integrating different modes of presenting information—such as text, images, and practical interaction—helps maintain attention and facilitates more effective learning (Mayer, 2005, p. 219).

Didactic Applications:

• Use of multimedia materials: videos, animations, and digital simulations help capture attention and reduce lesson monotony.
• Experiential learning**:** activities involving movement (e.g., game-based learning) enhance engagement.

• Collaborative learning: working in small groups maintains a higher level of attention compared to prolonged frontal lessons.

Microlearning and Chunking

Microlearning involves breaking content into short, focused units, facilitating sustained attention and memory retention (Hug, 2005, p. 55).

Chunking is a strategy that consists of grouping information into smaller, meaningful units, making it easier to process (Miller, 1956, p. 84).

Didactic Applications:

• Short and modular lessons, structured into 10-15 minute units**.**
• Use of diagrams and concept maps to visually organize information.
• Frequent reviews in small doses, instead of long and intensive study sessions.

Metacognitive Strategies and Self-Regulation

Attention can be enhanced through metacognitive strategies that help students develop awareness of their learning process and improve cognitive self-regulation (Flavell, 1979, p. 906).

Didactic Applications:

• Planning and self-regulation: teaching students to break down tasks into steps and manage study time effectively.
• Metacognitive reflection: encouraging students to monitor their understanding with questions like *"What did I understand?"* and *"Which strategies helped me the most?"*.
• Attention self-control techniques, such as the Pomodoro Technique (25-minute study sessions followed by short breaks).

Managing attention in learning is a crucial challenge for teachers, who must design learning environments that minimize distractions and optimize students' cognitive resources. An evidence-based neuroscience approach suggests:
• Structuring lessons into short and interactive segments to prevent attention decline.
• Using multimodal strategies to stimulate multiple sensory channels.
• Promoting self-regulation and metacognitive awareness.

Integrating these principles into daily teaching not only improves learning outcomes but also fosters inclusion, addressing the diverse cognitive needs of students.

Motivation and Engagement in Learning

Motivation is a key factor in the learning process, as it influences persistence, effort, and the ability to overcome challenges. Neuroscientific research has shown that learning is strongly influenced by brain reward systems, mediated by dopamine (Schultz, 1998, p. 272). Moreover, motivational models from educational psychology provide insights into how to structure learning environments that promote students' active engagement (Deci & Ryan, 1985; Dweck, 2006).

Self-Determination Theory (Deci & Ryan, 1985)

According to Deci and Ryan (1985, p. 103**)**, human motivation is regulated by three fundamental psychological needs**:**
• Autonomy**:** the need to feel in control of one's actions and choices.
• Competence**:** the need to feel capable and achieve positive outcomes**.**
• Relatedness**:** the need for social interaction and emotional support.

Didactic Implications:
• Providing students with some degree of choice in learning activities.
• Offering challenging but achievable tasks with appropriate scaffolding.
• Creating a positive and collaborative classroom environment.

Achievement Goal Theory (Dweck, 2006)

Dweck (2006, p. 35) distinguishes between two types of mindset related to motivation:
• Fixed mindset**:** students believe that their abilities are innate and unchangeable, which may reduce effort when facing difficulties.
• Growth mindset**:** students believe that intelligence and skills can develop through effort and learning.

Didactic Implications:
• Promoting a culture of error as a learning opportunity.
• Encouraging active learning strategies and problem-solving.
• Providing process-focused feedback (e.g., *"You have improved your analysis, keep going!"*).

The Role of Dopamine in Learning

Dopamine is a neurotransmitter essential for motivation and reward mechanisms (Schultz, 2015, p. 191). When a student experiences satisfaction from achieving a goal**,** the brain releases dopamine, reinforcing behavior and encouraging future learning (Cohen & Blum, 2002, p. 314).

Didactic Implications:
• Positive feedback should be timely to maximize dopamine release.
• Learning should be challenging but not frustrating to keep the motivational system active.

• Surprise and novelty elements help stimulate curiosity and engagement.

V. Didactic Strategies to Increase Motivation

Gamification and Game-Based Learning
The use of game elements in education can increase student engagement (Gee, 2003, p. 75). There are two main approaches:

• Gamification: the application of game dynamics in non-gaming contexts (e.g., rewards, levels, points).
• Game-based learning: the use of actual games to facilitate learning (e.g., simulations, serious games).
Didactic Applications:
• Creating point and badge systems to reward progress.
• Using educational escape rooms to stimulate problem-solving and collaboration.
• Applying digital simulations to learn complex concepts.

Cooperative Learning and Peer Tutoring
Cooperative learning is a strategy that enhances motivation through social interaction and knowledge sharing (Johnson & Johnson, 1999, p. 73). Peer tutoring allows more experienced students to support their classmates, improving both the tutor's understanding and the inclusion of students with greater difficulties.
Didactic Applications:

• Structuring small-group activities with clear objectives and defined roles.
• Creating peer tutoring activities, where experienced students help their classmates.
• Using cooperative learning strategies such as the jigsaw method.

Educational Relationship and Motivational Feedback
The quality of the teacher-student relationship has a significant impact on motivation (Wentzel, 1998, p. 202). Effective motivational feedback should be:

• Clear and specific, guiding students toward improvement.
• Process-oriented, rather than focused solely on the final result.
• Authentic and constructive, reinforcing students' self-efficacy.
Didactic Applications:

• Providing written and oral feedback that highlights progress, not just mistakes.
• Using self-assessment techniques to develop self-regulation.
• Creating a safe learning environment, where students feel free to express themselves without fear of judgment.

Final Considerations
Integrating neuroscientific and psychological strategies into teaching allows students to actively engage and apply motivational principles in learning. Key aspects to consider include:
• Encouraging autonomy and a sense of competence in students.
• Stimulating intrinsic motivation with engaging and meaningful activities.
• Using gamification, cooperative learning, and feedback to maintain a high level of engagement.

A motivation-based teaching approach not only improves academic performance but also promotes a positive attitude toward lifelong learning.

VI. Neuroscience and Inclusive Teaching: Neurodiverse Learning – SLD, ADHD, and SEN

Inclusive education represents one of the most significant challenges in contemporary teaching. Neuroscience provides essential insights into understanding the learning mechanisms of students with Specific Learning Disorders (SLD), Attention Deficit Hyperactivity Disorder (ADHD), and Special Educational Needs (SEN), enabling the adoption of evidence-based teaching strategies.
Neuroeducational research highlights the importance of personalized teaching that considers students' neurocognitive variability and employs flexible methodologies to promote accessibility and inclusion (Rose et al., 2014, p. 102).

Specific Learning Disorders (SLD)
SLD includes dyslexia, dysorthographia, dysgraphia, and dyscalculia, conditions that affect the ability to read, write, and calculate despite normal intelligence (DSM-5, APA, 2013, p. 67). Neuroscientific research has shown that dyslexia is associated with dysfunctions in the left temporo-parietal and frontal areas, which are involved in phonological processing and visuoverbal decoding (Shaywitz et al., 2002, p. 935).

Didactic Implications:

• Encouraging the use of compensatory tools (text-to-speech software, concept maps).
• Integrating a multisensory method for learning to read (e.g., Orton-Gillingham method).
• Simplifying texts and using scaffolding strategies for gradual support.

Attention Deficit Hyperactivity Disorder (ADHD)
ADHD is characterized by difficulties in sustained attention, impulsivity, and hyperactivity, with alterations in executive functions mediated by the prefrontal cortex (Barkley, 2014, p. 110). Neuroimaging studies have shown a reduction in the volume of the dorsolateral prefrontal cortex, a crucial area for attention control and self-regulation (Cortese et al., 2012, p. 899).

Didactic Implications:
• Structuring short activities interspersed with active breaks (brain breaks).
• Using the token economy to reinforce positive behaviors.
• Favoring an organized learning environment with clear instructions.
Special Educational Needs (SEN)
The SEN category includes students with non-specific learning difficulties, cognitive disabilities, emotional-behavioral disorders, and disadvantaged socio-cultural backgrounds (MIUR, 2012). Neuroscientific research suggests that the learning environment and individualized support can significantly influence the cognitive and emotional development of these students (Vygotsky, 1934/2018, p. 82).

Didactic Implications:

• Creating a flexible and accessible learning environment.
• Using cooperative learning strategies to promote inclusion.
• Personalizing activities according to students' individual needs.

Universal Design for Learning (UDL)
The Universal Design for Learning (UDL) is an inclusive teaching model that promotes an accessible learning environment for all, regardless of cognitive and sensory abilities (Meyer et al., 2014, p. 45). According to UDL, teaching should be designed based on three fundamental principles:

• Multiple means of representation (varying the ways information is presented: texts, images, videos).
• Multiple means of action and expression (offering different response and assessment methods, e.g., oral, written, multimedia).
• Multiple means of engagement (adapting teaching methods to respond to different learning styles).

Didactic Applications:
• Using accessible digital materials (e.g., high-legibility texts).
• Creating customizable activities based on students' needs.
• Implementing compensatory tools to support learning.

VII. Assistive Technologies and Compensatory Tools

The use of assistive technologies can significantly enhance learning accessibility for students with SLD, ADHD, and SEN (Edyburn, 2020, p. 213). Compensatory technologies help reduce cognitive load and improve teaching effectiveness.

Examples of Compensatory Tools:

• Text-to-speech software for reading complex texts.
• Speech recognition software to support writing.
• Digital concept maps for organizing information.
• Time management apps for students with ADHD.

Multisensory Teaching and Embodied Cognition
Multisensory learning is based on the idea that the simultaneous use of multiple sensory channels (vision, hearing, touch, movement) promotes deeper information processing (Shams & Seitz, 2008, p. 177). The concept of embodied cognition suggests that involving the body in the learning process enhances comprehension and memory retention (Wilson, 2002, p. 634).

Didactic Applications:
• Multisensory methods for reading and writing (e.g., Montessori Method, Orton-Gillingham).
• Using movement in learning (e.g., experiential learning, educational theater).
• Manipulating concrete materials to develop logical-mathematical skills.
The integration of neuroscience into inclusive teaching offers new perspectives for personalized education. Evidence-based strategies, such as Universal Design for Learning, assistive technologies, and multisensory teaching, help overcome learning barriers and ensure the right to education for all students.
The neuroeducational approach confirms that inclusion is not only a regulatory goal but also an added value for improving teaching quality.

VIII. Conclusions

The analysis of psycho-educational and didactic interventions for students with behavioral disorders has highlighted the importance of a multidisciplinary approach, in which neuroscience and pedagogy collaborate to promote school inclusion. Research findings confirm that motivation, engagement, and personalized support are key elements in improving the learning experience of these students. Evidence-based strategies, such as the Universal Design for Learning (UDL) model and the use of assistive technologies, demonstrate a positive impact in making teaching more accessible and adaptable to the specific needs of students with behavioral disorders.
A crucial aspect that emerged from the analysis is the role of dopamine in learning processes and behavioral regulation. Designing stimulating educational environments that incorporate elements of gamification, cooperative learning, and active methodologies promotes the release of neurotransmitters involved in motivation and school participation. This suggests the need to integrate neuroscientific discoveries into teaching models to enhance the effectiveness of educational strategies.
These findings have direct implications for both initial and in-service teacher training. It is essential that training programs include modules dedicated to understanding applied neuroscience in education, enabling teachers to acquire practical tools for managing inclusive classrooms. Continuous professional development should promote updates on personalized teaching strategies and the early identification of special educational needs, ensuring more targeted and effective interventions.
Despite research progress, some critical issues remain that require further investigation. The transfer of neuroscientific knowledge into educational practice still presents challenges, particularly in measuring the long-term effectiveness of interventions. Additionally, the need for longitudinal studies is a central element in validating evidence-based teaching strategies and consolidating their application in school settings.
Looking to the future, fostering a closer dialogue between neuroscience, pedagogy, and educational technologies will be essential to developing increasingly effective and inclusive approaches. Investing in interdisciplinary research will allow for the refinement of teaching methodologies, ensuring better support for students with behavioral disorders and contributing to a truly inclusive school that meets the needs of all learners.

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