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BRAIN-BASED LEARNING IN ENGLISH LANGUAGE TEACHING: PRINCIPLES, IMPLEMENTATION, AND CHALLENGES

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Abstract: Brain-Based Learning (BBL) aligns teaching strategies with cognitive and neuroscientific principles to optimize learning outcomes. This study explores the application of BBL in English Language Teaching (ELT), emphasizing its effectiveness in enhancing engagement, comprehension, and retention. BBL incorporates twelve key principles: parallel processing, emotional engagement, experiential learning, pattern recognition, and real-world application. These principles support active learning by leveraging multisensory experiences, social interaction, and an enriched classroom environment. The study also examines Eric Jensen's three-phase teaching model, which consists of preparation, active learning, and reinforcement, demonstrating how these stages align with cognitive science. While BBL presents advantages such as improved motivation and more profound understanding, challenges include the need for teacher training, resource availability, and alignment with assessment methods. The findings highlight the potential of BBL to transform ELT by creating more effective and engaging learning environments. Future research should explore innovative ways to integrate BBL with emerging educational technologies to enhance its application in diverse classroom settings.

Keywords: *Brain-based learning; engagement; ELT*

INTRODUCTION

Brain-Based Learning (BBL) has emerged as a significant paradigm that aligns teaching strategies with cognitive and neuroscientific principles. Originally coined by Leslie Hart in 1975, this paradigm advocates language learning based on the brain's natural learning processes. Scholars have demonstrated that learning is enhanced when it is aligned with how the brain processes, stores, and retrieves information (Caine & Caine, 2006; Jensen & McConchie, 2020). The BBL principles are rooted in neuroplasticity or the brain's capacity to reorganize itself through experience and learning, which is strengthened through emotions, sensory input, and an enriched environment. As a result, BBL has been widely applied across various disciplines.

Though recent studies highlight the effectiveness of BBL in learning, such as improving young learners' reading and spelling abilities and enhance higher-order thinking skills and motivation in physics learning (Esplendori et al., 2022; Wang & Zeng, 2022), its particular application to English Language Teaching (ELT) remains underexplored. Recent studies already demonstrate the impact of BBL on learning (Aulina et al., 2024; Fathelbab et al., 2024; Immordino-Yang et al., 2019; Immordino-Yang & Damasio, 2007). However, while its cognitive advantage or "Protégé Effect" indicates that students who teach others retain information more effectively have already been recognized, few theoretical studies linking these insights directly to the ELT instruction. More efforts are needed to explain how the BBL principles enhance English language acquisition in classroom settings.

This study aims to bridge this gap by exploring how BBL can be effectively implemented in English language instruction while identifying its advantages and challenges in real-world educational contexts. Three key aspects of BBL in ELT are examined in this study: The BBL principles in English language learning; the implementation of BBL in ELT classrooms; and the critical reflection on BBL. The findings contribute to ongoing discussions on innovative pedagogy, emphasizing the importance of aligning classroom practices with how the brain learns best.

METHOD

This study adopts a library research approach. The process involved selecting key sources from cognitive science, neuroscience, and educational theory to identify fundamental BBL principles and their alignment with ELT practices (Jensen & McConchie, 2020; Sousa, 2017, 2024; Tokuhama-Espinosa & Nouri, 2020). The study primarily focused on articles published between 2015 and 2025 on theoretical studies, empirical research, and practical applications of BBL in education. The sources of data were obtained through "Publish or Perish" software to get a diverse and credible body of literature. The content analysis procedure were used to analyze the data through categorizing, comparing, and synthesizing information to identify key themes and patterns. The first stage involved thematic categorization to provide a structured framework for discussing BBL's relevance to ELT. The second stage was to evaluate the consistency of findings across studies by identifying common trends and contrasting perspectives. The third stage was implementing a critical evaluation to examine the strengths and limitations of BBL in ELT. Finally, the findings were synthesized to illustrate how BBL principles align with ELT pedagogy and suggesting practical implications for educators.

DISCUSSION

Principles Of Brain-Based Learning In Elt

The principles of BBL is displayed in Figure 1.

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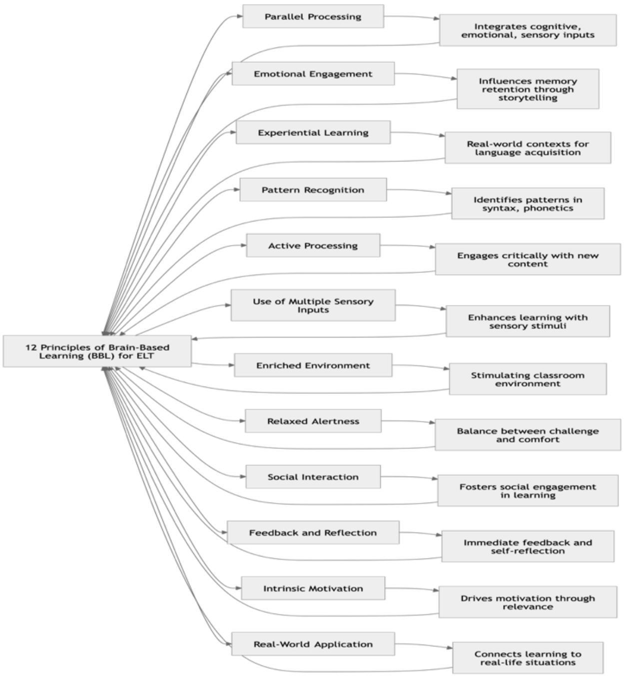

Figure 1. The 12 BBL Principles in ELT

Figure 1 shows how the twelve principles are deeply interconnected and form a framework of brain-based approach to ELT practice. Table 1 presents each of the principle, its main idea, and its application in ELT.

Table 1. 12 Principles of Brain-based Learning in ELT

Principle	Main Idea	Applications in ELT
1. Parallel Processing Sousa (2017, 2024); Jensen & McConchie (2020); ; Immordino-Yang & Damasio (2007); Teng (2023)	Brain processes cognitive, emotional, sensory stimuli simultaneously.	Integrate visuals (flashcards, diagrams), auditory input (nature documentaries), kinesthetic activities (role-playing, movement).
2. Emotional Engagement Immordino-Yang et al. (2019); Sousa (2017); Gotlieb et al. (2021); Jensen & McConchie (2020)	Emotions enhance memory, motivation, and retention.	Use storytelling, humor, collaborative group work, cultural exchanges to trigger emotional involvement.
3. Experiential Learning Immordino-Yang & Damasio (2007); Sousa (2017); Yun (2024); Fathelbab et al. (2024); Winantaka (2024); Esplendori et al. (2022); Wang & Zeng (2022); Zull (2023)	Learning through real-world experiences strengthens brain connections.	Role-playing, group discussions, multimedia (videos, songs, podcasts, virtual tours).
4. Pattern Recognition	Brain identifies recurring structures to	Teach syntax, phonetic patterns, semantic patterns; repetition of

Principle	Main Idea	Applications in ELT
Sousa (2017); Teng (2023); Zull (2023); Elmer et al. (2021); Sun et al. (2024)	enhance understanding.	structures in multiple contexts.
5. Active Processing Zull (2023); Gola et al. (2022); Şahin et al. (2023); Tokuhama-Espinosa & Nouri (2020); Caine & Caine (2006); Akcay et al. (2023)	Active engagement deepens learning.	Language analysis, solving language puzzles, creative writing, self-reflection activities.
6. Multiple Sensory Inputs Caine & Caine (2006); Sousa (2017, 2024); Jensen & McConchie (2020); Zull (2023)	Engaging multiple senses strengthens neural connections.	Use images, songs, podcasts, movement-based games, tactile materials.
7. Enriched Environment Caine & Caine (2006); Dwiputra et al. (2023); Gola et al. (2022); Winantaka et al. (2024); Immordino-Yang et al. (2019)	A rich emotional and intellectual setting boosts learning.	Color-coded materials, music, dynamic classroom layouts, reading and sensory zones.
8. Relaxed Alertness Gola et al. (2022); Jensen & McConchie (2020); Sousa (2017, 2024); Yun (2024); Aulina et al. (2024); Gotlieb et al. (2021)	Balance between challenge and comfort optimizes learning.	Scaffolding tasks, promoting growth mindset, encouraging mistakes as learning.
9. Social Interaction Immordino-Yang et al. (2019); Immordino-Yang & Damasio (2007); Jensen & McConchie (2020); Sousa (2017, 2024)	Social learning boosts comprehension and memory.	Debates, peer reviews, cooperative problem-solving, role-plays.
10. Feedback and Reflection Sousa (2017, 2024); Immordino-Yang & Damasio (2007); Jensen & McConchie (2020)	Feedback and reflection strengthen metacognition.	Real-time feedback, peer feedback, journaling, self-assessment.
11. Intrinsic Motivation Sousa (2017); Immordino-Yang & Damasio (2007); Jensen & McConchie (2020)	Personal relevance enhances focus and memory.	Autonomy, goal setting, integrating personal interests into tasks.
12. Real-World Application Immordino-Yang et al. (2019); Jensen & McConchie (2020); Sousa (2017, 2024); Willingham (2017)	Authentic practice solidifies learning.	Debates, presentations, real-world writing, problem-solving tasks.

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Principles 1, *parallel processing,* and 6, *multiple sensory inputs,* are fundamentally linked. These principles explain the brain's ability to handle cognitive, emotional, and sensory information simultaneously, and how the brain processes information by relying on the activation of multiple sensory pathways. By engaging visual, auditory, and kinesthetic inputs together, teachers optimize the brain's natural simultaneous processing ability, which in turn strengthens neural connections and memory retention for students in their learning experiences.

Principles 2, 8, and 11 address the brain's capacity that regulates emotion. These principles explain how storytelling, humor, and collaborative activities can engage students by creating an emotionally and psychologically safe learning environment, which is necessary for fostering risk-taking and resilience. Through scaffolding and positive reinforcement, students are encouraged to persist and grow throughout their learning journey. This supportive and safe environment, which is built through emotional engagement activities, can boost students' motivation and ease their learning journey, allowing them to thrive (Jensen & McConchie, 2020). Together, these principles build a foundation where emotional states enhance cognitive performance.

Principles 3 and 12 emphasize the contextualization of learning. Experiential learning immerses students in real-world scenarios that mimic authentic communication, while real-world application extends the experiences by pushing students to actively use their skills in meaningful, functional settings. Both principles rest on the notion that authenticity and relevance significantly deepen cognitive engagement and knowledge transfer.

The next three principles, which are principles 4, 5, and 10, are tightly connected through the explanation of cognitive strategies that enable students to master the language. These principles, 4 and 5, explain how students can recognize patterns to enable the brain actively processing the inputs and later manipulate them for speech production, understanding, and critical thinking, thus improving their flexibility and creativity in language use (Gola et al., 2022; Jensen & McConchie, 2020; Şahin et al., 2023; Tokuhama-Espinosa & Nouri, 2020). Principle 10 explains how teachers' feedback and reflection offer critical opportunities for students to refine, evaluate, and consolidate these patterns for their advantages. Together, they form a learning loop—detect, apply, assess—that leads to stronger long-term retention and flexible language use.

Principles 7 and 9 emphasize the importance of contextual and interpersonal richness in learning. An enriching classroom with colorful resources, dynamic activities, and emotionally safe enables students to deeply engage in the learning activities. This setting is strengthened by immersing students in authentic communication through social interaction, collaborative problem-solving, and peer learning. All of these activities stimulate both cognitive and emotional brain regions essential for language acquisition.

Implementation of BBL in English Language Classrooms

The 12 Brain-Based Learning principles provide a theoretical foundation for effective ELT practice, while Jensen's model offers a practical framework to apply these principles throughout the learning process (Jensen & McConchie, 2020). Jensen's approach follows three brain-aligned stages (Jensen, 2005). Figure 1 illustrates the 12 BBL Principles for ELT, highlighting key cognitive and neurological factors that enhance language acquisition.

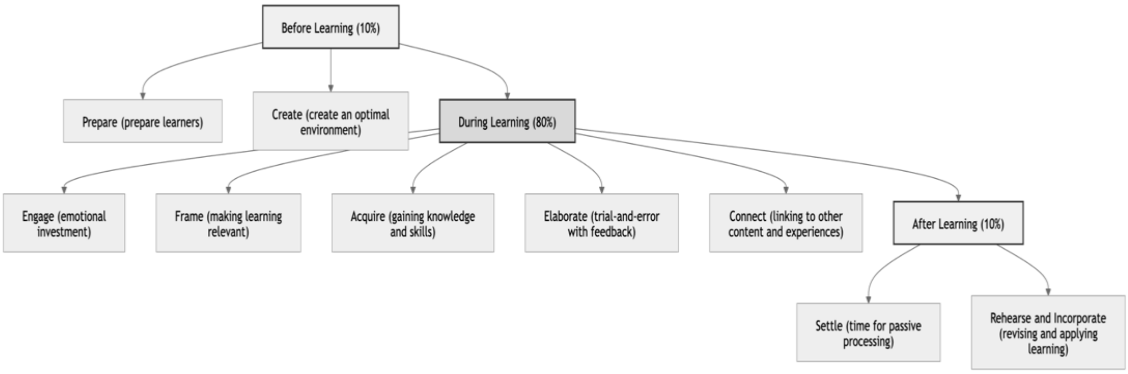

Figure 2. Jensen's Model

Table 2 shows how the BBL principles are integrated into each stage to create actionable classroom strategies.

Table 2. The Integration of 12 Principles of Brain-based Learning into Jensen's Model of ELT

Jensen's Model	BBL Principles	Key Brain Processses
Before-learning stage	Emotional engagement, motivation, optimal environment (Principles 2, 7, 8, 11)	Priming attention, lowering stress, raising relevance
During-learning stage	Active, sensory-rich, social, and feedback-driven learning (Principles 1, 3, 4, 5, 6, 9, 10, 12)	Encoding, meaning-making, schema building, application
After-learning stage	Reflection, application, real-world integration (Principles 5, 8, 12)	Consolidation, transfer, durable memory formation

The *before-learning stage* is critical for students' cognitive, emotional, and motivational readiness (Jensen & McConchie, 2020; Sousa, 2017). At this stage, teachers should implement principles 2, 7, 8, and 11 to establish an environment as an early emotional investment to enable students feel protected, appreciated, and motivated to learn (principle 2). An enriching and stimulating environment (principle 7) that maintains conditions of relaxed alertness (principle 8) can minimize students' stress and optimize their cognitive when learning. Furthermore, teachers should personalize learning by aligning objectives with students' interests to leverage their intrinsic motivation (principle 11).

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The *during-learning stage* constitutes the majority of instructional time (Jensen & McConchie, 2020). This phase naturally incorporates several BBL principles where active, complex cognitive processes dominate to strengthen learning. Teachers can employ multimodal learning that engages emotional, cognitive, and sensory channels (principles 1 and 6) during experiential learning activities (principle 3), such as role play and project-based tasks. In addition, the activities must be designed to promote active processing (principle 5) that encourages students to actively generate meaning by questioning, manipulating, and interpreting material. Activities of pattern recognition (principle 4) are also essential since these enable them to build new knowledge. Those activities can be tailored to cooperative tasks, peer discussions, and collaborative projects to leverage the social brain's natural strengths (principle 9). Immediate feedback and self-reflection activities will refine the students' mental models, strengthening their brain's neural pathways through timely reinforcement and error correction (principle 10). Finally, teachers should frame all these learning activities through real-world application (principle 12) to support knowledge transfer and enhance the meaningfulness of language learning experiences.

The *after-learning stage* involves passive processing and review to help consolidate and apply learning through memory-enhancing practices (Jensen & McConchie, 2020; Zull, 2023). Here, Jensen emphasizes two crucial functions: settling and rehearsing and assimilating, making BBL concepts on memory consolidation and reinforcement especially relevant. In this stage, teachers can facilitate active review and reflection activities (principle 5) by asking students to do self-assessment exercises, journaling, and creating a learning summary. During these activities, a low-stress environment (principle 8) must be maintained to allow students' reflection and natural integration of new information. Furthermore, teachers should make sure that students apply knowledge in authentic contexts beyond the classroom through public presentations, debates, community projects, or real-world writing tasks as their next projects (principle 12).

The integration of BBL principles into Jensen's model offers critical implications for ELT practices. This holistic approach not only enhances language acquisition but also cultivates adaptive, motivated students who are capable of applying and transferring their skills in diverse, real-world contexts. Ultimately, integrating neuroscience-informed strategies into ELT empowers teachers to move beyond rote learning models, hence nurturing more resilient, autonomous, and effective language users.

Reflection of BBL: Strengths and Weaknesses of Brain-Based Learning in ELT

BBL offers a range of strengths that enhance ELT practice by aligning instructional strategies with how the brain naturally learns. Among its key advantages is integrating multisensory engagement (such as visual, auditory, and kinesthetic stimuli) that supports various learning styles and promotes long-term retention (Sousa, 2017). Activities such as storytelling, simulations, and real-world applications create emotionally rich experiences, increasing motivation and attention (Jensen & McConchie, 2020). Furthermore, BBL emphasizes experiential learning and pattern recognition, which help deepen understanding and improve memory formation. It also fosters inclusive instruction by catering to diverse cognitive preferences (Caine & Caine, 2006) and prioritizes the creation of emotionally safe learning environments, reducing stress that might otherwise hinder cognitive performance (Immordino-Yang & Damasio, 2007).

Despite its advantages, implementing BBL effectively presents several challenges. A significant limitation is the teachers' need to possess a strong foundation in neuroscience and cognitive science, which is often lacking in teacher preparation programs (Tokuhama-Espinosa & Nouri, 2020). The design of BBL-informed lessons also demands significant planning, flexibility, and creativity—which can be difficult to sustain especially in resource-limited or time-constrained settings. Additionally, BBL frequently relies on access to specialized materials and technologies, which may not be readily available in all schools (Dwiputra et al., 2023). Classroom management can also become complex, as BBL needs a clear structure to encourage active participation and movement with minimum disruptions (Willingham, 2017). Lastly, the emphasis on experiential and applied learning is often at odds with traditional assessment systems that prioritize standardized testing and memorization (Willingham, 2017). While BBL enriches language learning through student-centered, brain-aligned strategies, its success depends heavily on teacher readiness, institutional support, and a shift toward more holistic assessment practices.

CONCLUSION

This study highlights the potential of the Brain-Based Learning theory to enhance ELT practice by aligning instructional practices with cognitive science. The BBL's emphasis on multisensory engagement, emotional connection, and real-world application creates an interactive and meaningful learning environment that supports deeper comprehension and long-term retention. Jensen's three-phase teaching model offers a practical framework to operationalize these principles in the ELT classroom. The strengths of BBL are in its capacity to support student-centered instruction that accommodates diverse learning styles. Strategies such as storytelling, movement-based activities, and problem-solving tasks can significantly enhance student motivation and memory retention. However, effective implementation requires intentional lesson planning, sufficient resources, and alignment with assessment practices. Therefore, neuroscience-informed teacher training and policy support for dynamic, experiential frameworks are essential.

This study is not without limitations. It offers theoretical insights without empirical classroom validation and does not address adaptations for diverse student populations, such as students with disabilities or multilingual backgrounds. Moreover, discussions of assessment practices and external constraints are also limited. Future research should empirically evaluate the BBL's impact across varying language proficiency levels, examine its long-term effects on language acquisition, adapt BBL strategies for online and hybrid contexts, and develop BBL-aligned assessment tools to bridge the gap between innovation and evaluation.

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