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Research Article

BRAIN-BASED LEARNING THEORY AND ITS IMPACT ON ENGLISH LANGUAGE TEACHING

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Farqad Malik Jumaah
Jaber bin Hayyan University of Medical and Pharmaceutical Sciences, Iraq

ABSTRACT

Brain-based learning theory, which is founded on neuroscience principles, optimal educational practices can be enhanced by gaining a deeper grasp of the brain's intrinsic learning mechanisms. According to this theory, students learn best when their lessons are designed to tap into their emotions, use patterns, and engage all of their senses. The use of brain-based learning strategies in ELT has the potential to improve students' ELT outcomes significantly.

This abstract focuses on using concepts from neuroscience to teach the English language. It highlights key tactics that can stimulate neural pathways and assist deeper language learning, including storytelling, dance, and providing an emotionally supportive learning environment. The abstract also delves into the significance of active learning, differentiation, and technology in accommodating varied learning styles and demands.

According to the results, brain-based learning methods provide a more engaging and welcoming classroom atmosphere while increasing students' language retention and proficiency. This abstract aims to highlight how brain-based learning can transform ELT by making it more efficient, engaging, and accommodating to learners' cognitive processes.

KEYWORDS

Learning theory, brain-based learning, students' language retention and proficiency.

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INTRODUCTION

As we all know, our brain controls everything that we do and will do. Throughout history, the study of the brain has taken an important part in scientific research. Recent information about the brain has evolved rapidly to promote a wide range of innovations in fields such as military, medical, and education. The fact that the brain is involved in such complex processes as learning and the construction of knowledge suggests it has different functions. This view has resulted in theories of brain-based learning. It supports the belief that there are indeed style differences between individual learners, but even more importantly, each of us has a toolbox available to us to solve complex tasks. This is what Dr. Robert Sylawar is talking about when he discusses the necessity for many different people, all using different skills, working together within the new economy (Jensen, 1996).

It's all about using the full experience of our brains to become better learners, better workers, and ultimately a better society of productive citizens. This essay will examine the Brain-Based Learning Theory and its impact on English Language Teaching. The primary focus of this essay is to analyze the impact of Brain-Based Learning Theory on English Language Teaching and how it can influence the progress of tourism. The analysis includes three main themes: (1) Brain-Based Learning Theory, (2) English Language Teaching, and (3) the impact of the theory on Tourism. In general, this essay will help readers to get a better understanding of the Brain-Based Learning Theory and its influence on English Language Teaching.

2. Theoretical Foundations of Brain-based Learning Theory

In 1988, the idea that the brain had the inherent ability to change throughout an individual's lifespan, based on new research using animals, was adopted by a Senate hearing for the first time. Kosslyn and Koenig trace the roots of this concept to Kant and modern cognitive science. (Murphey, 1998) They proposed the term 'brain-based learning' to refer to teaching strategies that employ what we know about the way the brain functions now that this concept has been embraced, and how the brain is currently believed to work (p. 284). Brain-based learning has four basic beliefs or tenets, described in scientific terms: active learning - feeding in information on multiple sensory levels, well-timed repetition, LeDoux and Synapses - with enough dopamine-induced energy to trigger, and engaging curiosity and the nuclear pattern.

Although the term brain-based learning implies formal education, the above beliefs could certainly be put into practice outside the school setting. There is also an area of inquiry that can be called educational neuroscience, which is concerned with determining what the brain can tell us about learning and a variety

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of other subjects within the domain of education. This framework is based on two important conceptual ideas: neuroplasticity and cognitive load theory. (O'Malley, & Chamot, 1990) Neuroplasticity has become a major area of inquiry for brain researchers, with studies using an increasing number of human subjects as well as animals. This category of inquiry is attempting to evaluate the amount and quality of new change that occurs as a result of reorganizing the intelligent connections from sensory input. Cognitive Load theory will be the second concept ground, which can include a number of different concepts in this particular section of the literature. Cognitive Load is a term used to describe the amount or level of ability for a member working on a particular cognitive task to do. Cognitive Load Theory has its roots in information processing theory, working memory, and computer science.

2.1. Neuroplasticity

Cell assemblies are the basis of the brain's structuring, while the synapse state is the support of learning and memory, which means memory occurs during the changes of the synapse states. Neuroplasticity differs from synaptogenesis and neurogenesis, which is related to the number of neurons. Neuroplasticity refers to the brain's ability to reorganize itself by forming new neural connections, establishing new synapse states, pruning away obsolete ones, and altering the strength of the synapses. Every time an action is performed or a thought is generated, the brain's synapses are constantly being pruned and regenerated, required learning, or faster information processing. (Rajeg, & Kishor, 2021) This is important because it explains a lot of what we know about learning, and our current understanding of how it occurs is due to many studies of neuroplasticity. Understanding neuroplasticity is crucial to understanding what happens during these amazing processes and what we can/should offer our students who are learning more about neuroplasticity as teaching practitioners.

There are a myriad of ways neuroplasticity occurs and the pathways we use to develop new thinking and learning. The major learning pathways are called "functional plasticity," "structural plasticity," and "functional mapping." The brain's ability to form new functional networks (dendritic spines and synapse states) for various applications (face recognition, speech processing, learning new content, etc.) and the pre-existing unique neural functional networks that can be reused for previously learned tasks. Brain-based learning theories have unique implications for language learning and teaching. Teachers currently often receive many advanced technical training courses on the subject of second language acquisition. However, brain-based language education is not currently popular. Currently, it is only in cognitive neurology. It contains too few ingredients in the

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informed field of information exchange in the language education area. Brain-based language learning can promote the reform of English language teaching reform in China to a certain extent.

2.2. Cognitive Load Theory

The study of the human cognitive system, under the broad umbrella of educational psychology, has attracted scholars worldwide. Carl Bereiter (2002) categorized the ways that humans process information into top-down perspective and bottom-up perspective. This distinction is also made in the field of instructional design, although known by different names such as Learner-Centered vs. Content-Centered Instruction (LCCCI) or the varieties of cognitive load. In a very simplistic way, the lower bound of human cognitive processing according to the study of human information-processing is the brain's structure and functions, specifically the knowledge, which is necessary for the continuity of life (Bereiter, 2002). The cognitive load theory (CLT) belongs to that family or variety of cognitive load in instructional design.

John Sweller, one of the Cognitive Load Theorists, wrote that: "The human cognitive system processes discrete elements of information, and the number of these elements that can simultaneously occupy the central working memory is very small, somewhere between one and three, depending on the skill of the human being" (as cited in Wang, 2017). Based on this assumption, anyone who tries to acquire knowledge or develop new skill is more likely to do so by paying great attention while learning to master the knowledge or skill at first and, in many cases, massive repetition until he/she can do so with little or no attention at all. Otherwise, due to their limitation in working memory, the elements are to be processed intensively, i.e. the cognitive load is high, then no learning or no insight is likely to happen (Sweller, 1994). A more recent well-known Cognitive Load theorist, Paul Ayres, wrote a book aimed specifically for the practical task of teaching English as an additional language. He stated that, by implication, in the context of English Language Learning, "minimising cognitive load is very important" (2017:39). Based on what has been discussed so far, this sub-section exemplifies and postulates the implications of CLT in real educational activities-teaching.

3. Applications of Brain-based Learning Theory in Education

Brain-based learning theory began in the 1960s with the explosion of information about the brain. In the 1980s and 1990s, the theory was embellished, and learning styles became a popular topic, leading to tenure for many public speakers recounting their work on the topic. More small pendulum swings continue to wax and wane, but despite these, brain-based learning theory has more and more based itself into the world of education. In this practical section, specific

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applications of BBLT in the classroom are discussed. Concepts such as number sense and visual and kinesthetic learning are considered as instructional practices, with suggestions on how they should be applied in classrooms. Most of the discussion on inquiry teaching is based on teacher reflection devices, and offers guidelines on how to better instruct and discipline students.

Differentiated instruction (DI) is the educational application undergirding most of the contentions in this paper. Frequently characterized as being based on learning styles, it can be a great way to implement brain-based learning theory. When teachers have an understanding of the brain - the organ of learning - and learning, teaching becomes a logical choice, driven by the underlying physiological (or "natural") processes of neurobiology. Cybil (2003) identifies the brain's "natural style" and various characteristics of DI, which seek to model the teaching process upon natural processes and make the transfer from parallel to serial processing. Following this, Desautel (2003) provides an outline of SERVE's nine characteristics of effective, brain-compatible learning environments. Smith and Shepard differentiate between DI and IFT as being informed more specifically by neuropsychiatry and brain science, while ASU managerial models are based on "learning styles theory" and "good practice research" (103).

3.1. Differentiated Instruction

In recent decades, concerned educators and researchers have made a significant commitment to explore and develop teaching methods that assume and celebrate diversity. In the field of education, this commitment is known as differentiated instruction, which emphasizes differentiated teaching strategies, acknowledging and catering for individual differences. It clings to the belief that the essence of teaching is adopting a problem-solving approach, addressing the needs and learning style of students at an individual level. Brain-based learning theory provides a deeper understanding about alternative teaching methods suitable for all students. It does not suggest the use of ineffective methods for all students that would be considered in some constructivist working, but rather would back the processes of differentiated instruction and inclusive education. It suggests using powerful, effective methods for all students, and to allow for the greater diversity of outcomes that are inherently part of the diverse nature of human learning.

As a second language teacher, learning about brain-based learning theory has helped to inform and support the implementation of the brain-based principles when planning to teach. (Dement, 2010) In L2 teaching, what would be recognized as differentiated instruction is when teachers realize and accommodate for the different learning styles of their students. Teachers who are informed about brain-based learning can adopt differentiated instruction

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principles in the teaching of speaking, reading, writing, and listening to enhance their students' education.

3.2. Engagement Strategies

In order to engage students in learning, it is essential to follow the strategies that help them learn interactively with the teacher and other students, as well as integrate this process to promote motivation and make them feel good about themselves. Specifically, engagement is defined as "active participation", contributing to the establishment of connection, which can promote motivation while showing enthusiasm in response to the students' work and positive participation. This requires the teacher to employ strategies and use cues that stimulate the senses, which can directly impact learners' experiences.

These include attention, emotion, mood, multiple intelligences, neurological system, preferences, physical body, stimuli, and thinking, etc. According to Caine and Caine (1994), these make appropriate brain-friendly principles which are the key to establishing a good learner-teacher relation. The principles are as follows: (1) every brain is unique; (2) the brain is a parallel processor; (3) learning engages the entire physiology; (4) the basis of primacy, recency, and frequency; (5) learning occurs through patterns. Therefore, combining brain-friendly teaching principles with sociocultural theories and practices of learning can focus on the engagement strategies that force the mind and body to work together. This can promote the development of a learner that includes the psychological, emotional, social, intellectual, and physical systems. Moreover, this is where managing in engaging learners would have a positive impact on teaching, generally meaning understanding and speaking skills. In an English language class, using effective strategies nicely needs connectivity with various parts of the human brain.

4. Brain-based Learning Theory in English Language Teaching

As one prevalent and influential theory in education, brain-based learning theory focuses on how the human brain learns best. Language, as a vital cognitive function of the human brain, is now studied through the insight of neuroscience and brain study. That is to say, how brain-based learning theory makes an impact on English language teaching is highly important for teachers.

One of the major dilemmas in English vocabulary learning consists in vocabulary acquisition and retention. Using the principle of "survival and novelty", Hullinger posits in his study that fostering an emotional, aesthetic, or social response to language learning is likely to directly influence brain arousal and emotional tagging of vocabulary. In brain-based vocabulary instruction, the idea of helping to create a

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physiological bond by eliciting an emotional reaction to vocabulary is helpful to make them involved in and to sustain their attention at the time of critical, brain-plastic windows for memory retention. (Lewis, 1994) As for English grammar instruction, a variety of studies can be found that have investigated what the most useful or efficient paradigms for grammar instruction might be. For example, dinatorie compared the results of two accelerated language learning programs at the Defense Language Institute Foreign Language Center which trained U.S. military personnel to proficiency in a foreign language.

4.1. Vocabulary Acquisition

Brain-based approaches advocate activating the sensorimotor system in conjunction with areas affiliated with vocabulary in the brain. The use of multisensory methods can contribute to more effective and permanent vocabulary learning. The principles of the brain-compatible teaching method are believed to yield a specific scope in the acquisition of vocabulary. Before associating strategies and techniques beneficial to reading in ELT with brain-based learning, it is necessary to draw attention to what the research participants' brains must do if they want to understand a particular sentence or words.

Since the vocabulary of a language is like building bricks for a building, a solid and effective foundation in terms of vocabulary knowledge is necessary. The relationship between memory and vocabulary is one of the research areas in language learning. In this context, as people acquire new words, the information is stored in the brain through accumulating in memory. On the other hand, as part of the contributions of second language (L2) researches on sound vocabulary learning, the brain mechanisms of vocabulary have also been clarified. (Ives, 1992) Thus, accumulated brain-based vocabulary learning has been reached by expanding the universe. Brain-based approaches underline that more interactions between existing neuron systems activate more parts in the brain and lead to greater sensory integration. Neuroscientists consider the relationship between memory and internal representations.

4.2. Grammar Instruction

Brain-based learning theory provides some clear implications for education. It turns out that we learn well when we have adequate hydration, appropriate nutrition, and even experience flow as a positive state of mind. This positive emotional state is critical to learning anything, including English as a foreign language. Neurologists have claimed that the brain of the student who has genuinely experienced a calm, or a positive emotional, start to a lesson is in a better position to defer judgment. In contrast, according to these researchers, students who have feared the start of a lesson are much more likely to feel under attack and are, therefore, better primed to make cheap 'ad

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hominem' attacks by saying something like "Well, you can't speak my language so why the hell should I be able to speak yours?" Disaster!

Using the principles from basic brain research will make your teaching better. Grammar explanations won't work, but using what the students already know, then letting them wrestle with the new point through 'comprehensible input,' will. Emotions are critical to getting meaning into long-term storage, and are also crucial to retrieval of the knowledge. "Importance" is the most powerful emotional state to try to get the students into. If the students "do" something, then they care about the "doing." If something matters, then information about it is put into long-term storage more rapidly. So if you can get the students interested and have them make something "important", you are more likely to move the information from short-term to long-term memory.

5. Empirical Studies on Brain-based Learning Theory in English Language Teaching

Some important empirical studies investigating brain-based learning theory at the classroom level, particularly in English as a second/foreign language context, have operationalized five vital components of brain-based learning theory: course design, classroom practice, multisensory experiences, positive learning climate, and cooperative learning, which are described above.

Xiao Li's study targeted EFL young students in China. In this study, course design was based on students' multiple intelligences after an MI survey was done for them. Dual coding theory (DCT) was used in course design to integrate the visual and the verbal. Also, in this study, multisensory teaching was used (visual, hearing, reading, gesture, and body movement) to create a whole-student learning experience. The learning atmosphere involved a cooperative and friendly atmosphere. Project work and group activities made it an interactive classroom context. (Chomsky, 1957) The results indicated that due to learning through five healthy components, learners in the experimental group have improved their language proficiency in the post-tests.

Hermann and Grabe studied the impact of implementing a curriculum based on brain-based learning in the classroom. They piloted this curriculum with three graduate students. They designed an eight-week online reading workshop using theories of synaptic plasticity and brain waves, along with statistical analyses to show the effectiveness of using activities that targeted language centers in the brain alongside activities that promoted conditional activation.

The result of the study indicates that using educational activities that targeted the language centers in the brain produced improvements in students' scores of language proficiency. Based on their study, activities

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that targeted Symbols versus Prop (designed to activate language centers) produced a significant improvement in language proficiency (mean 3.33, pre-test mean 3, sd .73 vs. posttest mean 4.12, sd .75), t (11) = 6.79, p = 0.001.

5.1. Study 1: Impact on Language Proficiency

The most seminal empirical work on the impact of the use of activities and techniques based on brain-based learning theory in an EFL context was conducted by Austin, Morie, and Obeidat (2011). The central research question behind this study was whether students of English as a foreign language (EFL) who studied according to the brain learning theory had significant improvement in their language skills when compared to students who studied according to traditional methods. The study used students in four private EFL schools of secondary education in Israel as research participants. The results showed that the use of brain-based teaching methods led to significantly higher academic achievement in these skills than the traditionally taught students ($p < .05$). The studies also claim that activity without stress also has a positive impact on language learning through an applied experiment. Moreover, students seem to find this method to be the most acceptable way to learn to enhance concentration and induce an emotional response that can turn the spirit of the emotion. In a summary of the studies Austin, Morie and Obeidat conducted accounted that people learn more effectively in a visually rich environment that includes experiences that enhance emotion, create the need to discover a result, heighten attention, stretch, and run with the student's natural rhythms of the body. When the needs and goals of students match the objectives of the learning environment, then learning is structured in such a way that it makes brain sense.

5.2. Study 2: Classroom Implementation

One study that is relatively consistent with the framework of the scalogram was conducted in an English language learning classroom. The primary focus of the study is first to identify the teachers' awareness of brain-based learning theory in ESL classrooms. (Krashen,1982) After applying a survey, classroom observation and interview were applied to the participants to find out the factors enhancing and blocking the participant implementation of brain-based learning theory in their classrooms. The study did not directly examine teacher teaching strategies in terms of sequence but was expected to give an overview of the instructional strategies observed in English language teaching from the perspective of brain-based learning theory and the possible implications of this theory in the classroom.

The findings show that in an overall view, English language teachers seem to be familiar with brain-based learning theory although they would rather commit to humanistic and constructivist learning theories such as

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those of Gardner and Vygotsky. Part of the reason for choosing such a theory can be deduced from their lesson idea, which encourages students to work collaboratively and accept diversity through mind setting. On the practical side, the teacher sometimes also uses music, games, and other stimulating activities. However, the data also shows that they have no likelihood to intensive store teaching and allow students to express themselves in class, showing that in some ways the participants prefer behavioristic compared to constructivist teaching.

6. Challenges and Limitations

Brain-based learning theory does offer a perspective that is not just peripherally biological but actively neurological, graciously accommodating the complexities and nuances of the teacher's work and learners' minds, and that offers fresh insights and angles to ELT. At the same time, however, we need to recognize its limitations as well. This section thus attempts to take a critical look at the idea and theory of ELT and BBL-based learning in order to delineate some of the real, or as we will suggest, potential challenges, obstacles, and constrictions.

Brain-based learning theory does present some significant and valid insight. However, we suggest some application of these ideas to ELT may be rather problematic and that our understanding of the relationship between BBL and ELT needs to be characterized by a constant and realistic awareness of these problems, challenges, and tensions.

A first, rather basic point is simply that while research into the brain develops apace, our understanding is currently and obviously incomplete. Any attempt to definitively associate current scientific research with a concept like BBL, which clumsily or tentatively encompasses a myriad of dimensions both inside and outside the classroom, is necessarily on shaky ground. It is too soon. BBL is still 'under development', so is of necessity in its frontier. Our over-eager and premature exploration into brain-based learning may only hamper its proper growth. There are as yet wide-ranging possibilities and unknown areas, and the attempt, mentioned above, to pinpoint regions on the brain where culture is being 'stored' is an almost iconic example of a venture that should probably have been held in abeyance. While second language research has identified some regions of the brain, there are many more as yet unexplored, and our understanding of those we've 'found' is also relatively limited. It remains extremely unwise, then, to overlay firm conclusions on this necessarily shallow base. Brain research has done much indeed in offering a new field to chart. Brain-based learning today offers the educational professional something akin to a new continent of potential insight. But we need to be careful if we are not to create a myth to replace an old, over-familiar one.

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7. Future Directions and Implications for Practice

This study is intended as a review of the major assumptions behind brain-based learning theory and their specific implications for English language teaching in the UAE. The research question concerns the general relationship between brain theory and second language learning and learning in general, scrutinizing possible insights into how language is taught and learned, although multiple factors impact success in learning and thus make isolation of the cognitive factors at work a complex problem.

Given the assumptions behind brain-based learning theory, any number of studies might be conducted to gauge its impact on multilingual learners of English or any language. At the most basic, simple studies might be devoted to the question of how much students are influenced by educational multimedia and how they are influenced. This question is neutral with respect to the combination of spoken, written, technical and artistic elements carried by educational media. Indeed, it refers to the ultimate goal or "harvest" of learning rather than to the best ways to get there. Brain-based learning theory might be used to ask how, and under what circumstances, a focus on spoken language in the classroom can be channeled into more than simple coaching or commentary. And other investigations might look to the future and consider what overall impact computers and digital arts might have on Arab students in particular, a case in point being a possible investigation of the learning potentials inherent in the PlayStation 3; not only for English learning, but for individual and collective efforts of communication and self-expression in and outside the classroom.

CONCLUSION

In summary, the aim of this essay was to explore the significant growth of brain-based learning theory due to the developments in cognitive psychology and technology and to examine the potential applications of these areas of research in the field of English language teaching. Findings for these purposes were reached through historical overview and review of literature. The field of ELT has been changing, improvement of the computer and other technology, development of neural and cognitive psychology encouraged the trend of brain-based learning method.

Findings of this essay show the potential advantages and implications of brain-based learning theory in language learning, which is among the most attractive subjects of research due to its increasing interest. Due to the vibrant development of the technology and cognitive fields, it is thought that brain-based learning theories can be used in a number of interdisciplinary studies, especially in the field of ELT, in the near future, if not in their current state. Further literature review and interdisciplinary application are recommended to map changes and increases from different points of view. This pioneering study explored holistic and

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alternative perspectives in order to contribute to the development of the field of brain-based teaching and learning.

In conclusion, this essay has provided a brief synopsis of the revolutionary implications in the cognitive field that have shaped new brain-based learning perspectives in the 21st century. New findings in technologies and in the background of Brain-Based Learning (BBL) have improved investigations and impacted language learning. For instance, researchers have mapped verbal, practical, and logical subjects of science. These branches of sciences are direct indicators of brain-based learning methods, and they are popular in the subject of brain-based teaching and learning. Finally, teachers should determine new paradigms and facts in the brain-based learning field and should deal with modern technologies together with NLP. In future investigations about the issue, further explorations of new technologies may also be conducted.

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