

BRAIN-BASED LEARNING IN THE COURSE ENGLISH INTEGRATED SKILLS I
TAUGHT FOR THE BACHELOR'S DEGREE IN ENGLISH TEACHING AT
UNIVERSIDAD NACIONAL, COSTA RICA, SEDE REGIONAL BRUNCA, CAMPUS

PÉREZ ZELEDÓN

A Case Study

By

María Carranza Céspedes

Teresita Rivera Rodríguez

In Partial Fulfillment of the Requirements for
The Licentiate's Degree in Applied Linguistics in English

Universidad Nacional, Costa Rica

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**Defensa de Proyecto de Graduación de la Licenciatura en Lingüística Aplicada con Énfasis
en Inglés**

Presentado por las sustentantes

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Dedication

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List of Abbreviations

BBL	Brain-Based Learning
CI-UNA	Centro de Idiomas, Universidad Nacional
EFL	English as a Foreign Language
MBE	Mind, Brain, and Education
P80 L/S/R	Professor of Group 80 (Listening, Speaking, and Reading)
P80 G/W	Professor of Group 80 (Grammar and Writing)
P81 L/S/R	Professor of Group 81 (Listening, Speaking, and Reading)
P81 G/W	Professor of Group 81 (Grammar and Writing)
TEFL	Teaching English as a Foreign Language
UCR	Universidad de Costa Rica
UNED	Universidad Estatal a Distancia de Costa Rica
UISIL	Universidad Internacional San Isidro Labrador
UMCA	Universidad Metropolitana Castro Carazo
UNA	Universidad Nacional, Costa Rica

Abstract

This research aims at presenting the implementation of the Brain-Based Learning Approach in the Bachelor's Degree in English Teaching at UNA, Costa Rica, Sede Regional Brunca, Pérez Zeledón. The participants of this case study are two groups taking the course Integrated Skills I simultaneously and the four professors teaching this course. By means of observations, questionnaires, and interviews, the investigators found the correspondence of the integration of the BBL principles during the process of learning a foreign language. The results of this qualitative study indicated that the BBL was unknown by the participants. However, all teachers believe that physical activity is a significant aspect for stimulating learning. Additionally, brain uniqueness was highly taken into account in class. Some teachers acknowledged the lack of the implementation of some of the BBL principles in the lessons. These principles might complement the teaching strategies that instructors usually develop to enhance learning. Thus, the researchers propose a guide for teachers to use during the course. Each chapter includes one activity of speaking, writing, grammar, listening, and reading based on the topic studied. These activities reinforce the Brain-Based Principles that were least implemented in the observed classes and the ones considered essential by the participants. This broad topic under study allows further research to provide new contributions to the field of teaching through BBL principles.

Key words: Brain-Based Learning, principles, integration, mind, physiology, interaction, emotions, memory

Chapter One: Introduction

Foreign language learning is a process that involves a purposeful stimulus of the brain to achieve optimal levels of proficiency and retain new information. Hence, Willis (2008) mentioned that meaningful learning is achieved when instruction involves students and establish goals. Also, education where these two characteristics are taken into account contributes to enhancing the capacity for stimulating the learning of new information. This statement demonstrates that knowledge construction and memory stimulation are necessary to achieve successful foreign language learning. Furthermore, Willis pointed out that students' involvement and goals make learning conditions optimal for those who need to remember new information to which they are exposed. In addition, it encourages the establishment of neural connections that students can use to enhance the foreign language learning development. According to Trapp (2005), the Brain-Based Learning Approach, also known as Brain Natural Learning (BBL), reveals that using principles that stimulate the brain will “engage the learner, focus attention, and increase involvement...” (p. 73). Moreover, the Brain Natural Learning Principles recognize that language learning needs to involve the physical, cognitive, and affective components of students.

Body and mind are closely related when it comes to learning. As defined by Caine and Caine (2000), “when body, brain and mind are conceived of as [a] dynamic unity, then it becomes possible to identify core general aspects of how this system learns: we call them system principles of natural learning or the twelve Brain Natural Learning Principles” (p. 1). In this case, the author refers to “mind” as the emotions of the learner, and “brain” as the organ that controls and directs the physical and mental activities. In addition, Trapp (2005) indicated that instructors can facilitate learning by establishing relations among the body, brain, and the spirit of learning. Thus, by implementing the set of Brain Natural Learning Principles, teachers are able to encompass the physical, biological, and emotional needs of their students. The implementation

of the Brain Natural Learning Principles may boost students' brain capacity of retention, and thus, achieve a more dynamic language learning process. Based on this premise, Chapter One offers the introductory sections of the study. The statement of the problem, background information, research questions, and limitations are among these sections of study.

The Problem and Its Importance

Recent scientific innovations allow teachers to understand how the human brain changes and learns. Such innovations provide teachers with the opportunity to look for effective teaching strategies to improve students' academic achievement. Caine and Caine (1990) developed studies which supported that "educators who become aware of recent research on how the brain learns will gain exciting ideas about conditions and environments that can optimize learning" (p. 66). Based on this notion, if the knowledge about Brain-Based instruction were scarce, teachers would implement only part of this approach, and the brain potential would not be entirely maximized. Even when teachers in charge of the course English Integrated Skills I at UNA, Costa Rica, Sede Regional Brunca, Pérez Zeledón, are familiar with isolated techniques that enhance learning, based on questionnaires answered by the professors, it could be determined that they do not recognize these practices as belonging to the Brain-Based Approach as proposed by Caine and Caine. However, being aware that the Brain-Based Approach has techniques that contribute to undertaking research on language learning, they would be able to integrate brain, body, and emotions in their teaching practices.

After analyzing the first questionnaire sent to the four teachers of the English Integrated Skills I course at UNA, Costa Rica, Sede Regional Brunca, Pérez Zeledón, during the first semester in 2016, none of the instructors indicated that they were acquainted with the approach under study. Although all of the instructors said that they are unfamiliar with what is known as

the Brain-Based Approach, their answers revealed that they have unconsciously implemented some of its practical principles. Their unawareness of this approach may be the reason why they have not implemented all its principles in their teaching practices, which will be discovered through observations in future stages of the study. The teachers agreed on the principles as brain activators, but that is not substantial evidence that they put all of them into practice when teaching. Nevertheless, the implementation of these principles in the English Integrated Skills I course can act as an ally to enhance brain stimulus, which improves students' capacity to achieve long-lasting foreign language retention.

The Brain-Based Approach displays how teachers can create environments for active learning, taking into account how the brain learns, which is critical for students of a foreign language. Essentially, in the English Integrated Skills I course different students have an encounter with a foreign language for the first time during their major. Therefore, the techniques used by the teacher during this course have an impact on students' achievement and motivation to learn. Since this is the first intensive English course in the Bachelor's Degree in English Teaching, the received stimulation has a determinant influence on students' brain and attitude towards the language. This qualitative research has the purpose of exploring the Brain-Based Approach principles implemented in the English Integrated Skills I course in the first year of the Bachelor's Degree in English Teaching at UNA, Costa Rica, Sede Regional Brunca, Pérez Zeledón.

Theoretical and Practical Background

Neurolinguists have explored how the brain functions when learning a foreign language, and instructors have applied the results in teaching. For instance, Li, Legault, and Litcofsky (2014) stated that the brain's neuroplasticity has been studied in different subjects, but the

relationship between second language learning and neuroplasticity was understood later.

Anatomical changes occur in the brain as a result of one's bilingual experience. The researchers concluded that the gray matter density as well as white matter integrity increase. It means that the brain changes rapidly and is vulnerable to personal and external factors when an individual is learning a second language. Concerning the learning field, Palombo (2001) discussed how humans receive and process information. She described the human brain and the complex connection existing among mind, body, and learning performance in different areas.

Additionally, she highlighted that "physical movement affects thought," and explained how to maintain a healthy brain (p. 63). Jensen (2005) supported Palombo's ideas by stating that movement and learning are processed in the same part of the brain, which is the same as body, brain, and emotions working as a unit. Thus, it is recommendable to use strategies that highlight the relevant relation among the three elements.

The environment involves factors such as emotions and interactions that may influence the learning of a foreign language. Relating this idea to the field of teaching, Immordino and Damasio (2007) reflected on connections between emotion, social functioning, and decision-making as well as their effect on education. They focused their research on brain-damaged patients; therefore, they intended to provide a new basis for innovation in the design of learning environments. The researchers claimed that teachers should appreciate students' emotions, which are a critical force among scholars (Immordino & Damasio, 2007, p. 9). Moreover, Oduola and Hakirat (2012) studied how the brain works and the relationship that it maintains with learning; they promoted thinking skills in the classroom. The Brain-Based Learning principles are also a contribution to answer inquiries about how the brain works and how to increase the brain's capacity to retain data. Caine and Caine (1990) shaped a determinant decade on brain research

due to the fact that previous to this period minimal research had been completed on this subject. These two researchers provided the twelve principles for the Brain-Based Approach, and stated that “the greatest challenge of brain research for educators does not lie in understanding the anatomical intricacies of brain functioning but in comprehending the vastness, complexity, and potential of the human brain” (p. 66); thus, the learner has to be perceived as a holistic being who is affected by the environment.

Additionally, this approach served different purposes; for example, Fischer (2009) studied an emerging field of mind, brain, and education (MBE), which aimed at mixing “biology, cognitive science, development, and education to create a strong research foundation for education” (p. 3). This research foundation intended to assess pathways for teachers and students in order to track their own improvement. Another research conducted by Trapp (2005), merged the Brain-Based Approach with adults to improve learning and long-term memory. She proposed educators to connect spirit of learning, brain, and body in order to make education meaningful to adult learners. For instance, the researcher highlighted the importance of addressing emotions, becoming familiar with the information, focusing attention, and retaining information. Three years later, Kaufman, Robinson, Bellah, Akers, Haase, and Martindale (2008) developed ideas for enhancing learning through relaxed alertness, orchestrated immersion (the involvement of students in environments that uphold meaningful learning) in complex experience and active processing of experience. These international studies have supported the idea that the brain requires coordination with the spirit and the body to learn more efficiently.

In 2012, *Telenoticias* broadcast an interview with Andre Vermeulen about *Brain-Based Learning and Development*. He is a neurologist who visited Costa Rica to promote programs of emotional intelligence, which are assessed by Neurolink, Vermeulen’s company from South

Africa. This company has promoted Brain-Based programs in different countries, including Costa Rica. He explained that learners should know themselves in order to develop emotional intelligence. Vermeulen (2012) claimed that all learners are talented and intelligent; however, they need to understand the way they learn more efficiently. Furthermore, Costa Rican universities, which offer the English Teaching major or similar degrees, do not document projects or investigations similar to the Brain-Based Learning made by national researchers or by foreigners in the country. To list local universities, Universidad de Costa Rica (UCR), Universidad Estatal a Distancia de Costa Rica (UNED), Universidad Latina, Universidad San Isidro Labrador (UISIL), and Universidad Metropolitana Castro Carazo (UMCA) have not reported any thesis or physical/digital national research related to Brain-Based Learning in their corresponding libraries. Universidad Nacional, Costa Rica (UNA), including Sede Regional Brunca, in which this study took place, does not record previous investigations related to the topic under study.

As a final point, the studies described prompted changes that should be made in the teaching and learning of languages. Therefore, teachers could develop the twelve Brain-Based Learning principles in the Bachelor's Degree in English Teaching at UNA, Costa Rica, Sede Regional Brunca, Pérez Zeledón as proposed by Caine and Caine (2000).

Research Questions of the Study

Central Question

1. What principles of the Brain-Based Learning Approach are implemented by the professors of the English Integrated Skills I course in the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón?

Associated Sub-questions

1. What are the impressions that the professors of the English Integrated Skills I course in the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón, have regarding the twelve Brain-Based Learning principles?
2. What strategies derived from the Brain-Based Approach can be suggested to professors in order to activate students' brains during the English Integrated Skills I course in the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón?

Limitations

The development of this research may encounter some problems such as the lack of specific information about the topic under study from varied authors. The study entails two areas of expertise: neuroscience and education. Thus, it was difficult for researchers to have any help from neurolinguists who are knowledgeable about language and brain functioning at the same time. To minimize this problem, the researchers did deep research and extensive reading to find necessary data on online on academic searchers like journals, articles, and books. Also, the researchers tried to reach some authors that study the brain development in education. Secondly, one factor to consider is the researchers' availability for meetings and arrangement of weekly observations to analyze the data. Therefore, there was constant communication between the researchers and prioritization of goals during the process. Thirdly, another substantial factor is the teachers' availability to be observed and their willingness to collaborate. Fortunately, the collaborative teachers were willing to be observed. Thus, it is essential to go unnoticed through non-participant observations in order to avoid distractions and possible changes in the plan. In

addition, a schedule can be designed with the collaborating teachers to ensure consistency in the observations and the administration of instruments.

Coding

BME: Brain, Mind, and Education

P81 L/S/R: Professor in charge of Listening/Speaking/Reading segment from the English

Integrated Skills I course in group 81

P81 G/W: Professor in charge of Writing/ Grammar segment from the English Integrated Skills I course in group 81

P80 L/S/R: Professor in charge of Listening/Speaking/Reading segment from the English

Integrated Skills I course in group 80

P80 G/W: Professor in charge of Writing/ Grammar segment from the English Integrated Skills I course in group 80

Unconscious learning: The Brain-Based Learning Approach refers to unconscious learning as the deliberate or involuntary processes of learning.

Chapter Two: Literature Review

The main purpose of this qualitative study is to investigate the implementation of Brain-Based Principles by teachers of English as a foreign language (TEFL) in the first level of the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón. Taking this aim as its basis, Chapter Two provides a historical background of the Brain-Based Approach, presents critiques of Brain-Based education, explores the relationship between language and the brain, describes foreign language learning, explains what Brain-Based learning is and its twelve learning principles, mentions brain activating techniques, displays studies that support and question the principles, and finally, considers recommendations that allow the implementation of Brain-Based strategies in class.

Historical Overview of the Brain-Based Approach

A brief look at psychology contributes to understanding the fundamentals of the Brain-Based Learning Approach. Behaviorism, *Gestalt* Psychology, and Perceptual Psychology are some of the contributions to this approach. Behaviorism, proposed by Skinner, is based on an operant condition. This theory assumes that individuals' behavior can be conserved and modified through the consequences of such behaviors (Geethu & Minikutty, 2016). This is also present in the teaching field through positive reinforcement when individuals are rewarded for their effective performance. Moreover, in 1912, Max Wertheimer proposed a form of psychology called *Gestalt*. *The Merriam-Webster Dictionary* defines *Gestalt*, a word of German origin, as "something that is made of many parts and yet is somehow more than or different from the combination of its parts" ("Gestalt", 2016); in other words, it means that the brain is capable of processing details and also of placing those details in a bigger picture at the same time, so that they are remembered not only as isolated facts but also as part of a whole. Koffka (1999) explained that Gestalt Psychology deals with the discovery of what details of nature are part of

functional wholes, their degree of relative individuality, and also the articulation of wholes into sub-wholes; students need to make sense of a situation (as a whole) and relate it to what is being learned.

According to Caine, Caine, McClintic, and Klimek (2009), “it should be expected that the brain and mind are designed to deal with the difference between parts and wholes... the way in which human beings “‘construct’ reality has been a central issue in psychology for a long time” (p. 130); thus, not only Gestalt psychology but also perceptual psychology intend to understand this fact. Moreover, students can choose what to assimilate and what to ignore. For instance, the brain selects and retains what it finds useful. The term “perception” is defined as “awareness of the elements of environment through physical sensation” and “the ability to understand or notice something easily” (“Perception”, 2016). Perceptual psychology, as oriented to instruction, is also known as perceptual learning; this learning establishes that perceptions are a means to obtain significant information from the environment or context “to guide actions adaptively” (Adolph & Kretch, 2015, p. 127). This means that problems are first identified through the senses so that a solution can be provided to them.

Historic theories such as Behaviorism, Gestalt, and Perceptual Psychology have preceded and contributed to the field of teaching, helping instructors to understand how the brain works, and thus, making advances and improvements possible. However, research on learning never stops. In the nineties, the writer Geoffrey Caine and the professor Renate Caine did research on the Natural Learning approach, which consists in how the brain learns naturally when the information is meaningful. They explained that "the objective of brain-based learning is to move from memorizing information to meaningful learning" (Caine & Caine, 1990, p. 69). Meaningful learning is achieved when embedded with three interactive elements: relaxed alertness,

immersion, and active processing. They proposed these three instructional elements and twelve principles that would allow learning naturally. Caine and Caine wrote approximately nine books, ten chapters, twenty-six articles, and three papers in which they explored the brain in detail and its relationship with learning along with the collaboration of other professionals (teachers, researchers) such as Crowell, S., McClintic, C., and Klimek, K. These collaborations resulted in new research and more information that contributed to the teaching field, and provided teachers with information about the brain functioning and techniques that could help teachers maximize their students' brain capacities.

Critiques of Brain-Based Education

Authors such as Eric Jensen, Laura Erlauer, and Judy Willis have explored and made contributions to Caine and Caine's Brain-Based learning. However, there are also analyses that question its effectiveness, and thus, the convenience of its application. This is the case of Bruer (1997) who supported the behavioral science and questioned the brain-based curricula strongly. He claimed that neuroscience has not discovered how to guide educational practice. For example, Bruer disregarded Caine and Caine's principle that wholes and parts are perceived simultaneously. He pointed out that this statement might be true, but it is described in a way that cannot be used to identify any specific brain system. He stated that it cannot provide direct and complete implications for educational practice, and that some principles come from other disciplines and not from neuroscience.

According to Bruer, teachers must rather rely on a science of mind and a cognitive science, which can bring practical innovations for learning and instruction. He proposed that in the future, there should be a development of a relationship among investigation programs, cognitive psychology, and systems neuroscience in order to support learning. Ten years later,

Eric Jensen (2008) discussed on Bruer's statements against Brain-Based learning. He defended that educators had to be prepared to be more capable of incorporating new cognitive neuroscience discoveries into the teaching field than ten years before. Jensen added that Harvard University has master's and doctoral programs in brain-based education called Brain, Mind, and Education (BME) Program, which aim to integrate cognitive science and neuroscience with education not only for research but also for practice. Teachers have increased their awareness of the brain and its functions for the last few years in order to diminish criticism of their lack of knowledge in this area of study. The brain-based community claimed that students' brains are significant to them, thus, BBL (Brain-Based Learning) is expected to prevail.

Language and the Brain

The human brain not only stores information but also directs all other activities of the body, including processing and producing a language. Therefore, to understand how the brain is related to language, it is necessary to be familiar with the regions and portions of the brain that are essential for understanding and producing language. First, the brain is divided into two hemispheres, which process different information. Each hemisphere has four parts, called lobes: the temporal lobe, the frontal lobe, the occipital lobe, and the parietal lobe (Appendix E). The temporal lobe receives auditory stimuli, the frontal lobe is related to higher thinking and language production, the occipital lobe is more related to visual input, and the parietal lobe has less relation with language (Bergmann, Hall, & Ross, 2007). These regions of the brain related to language are covered by a cortex, which has portions that also take an active role in language use.

To begin with, the first portion that affects language is the visual cortex, located in the occipital lobe of each hemisphere, and is in charge of receiving, interpreting, and storing images.

Therefore, teachers can stimulate this part of the brain by presenting visual material to students about language that requires memory. The second is the auditory cortex, located in the temporal lobe, and it is responsible for receiving, identifying, and interpreting auditory signals. A third portion is the motor cortex, placed in the frontal lobe, and it is responsible for sending signals to the muscles, including the muscles for speaking. However, the most significant language centers in the cortex or portions are Broca's area, Wernicke's area, and the angular gyrus. The first one organizes the articulatory patterns of language and directs the motor cortex when a person wants to speak. This area also controls the use of inflectional morphemes. The second area is associated with the understanding of words, sentences, and the choice of the accurate words to be used for certain contexts. The last language center transforms visual stimuli into auditory stimuli and vice versa to match spoken and visual stimuli (objects and written material). In sum, Broca's area is essential to produce language (pronunciation), Wernicke's area is necessary to understand it (lexicon and meaning), and the angular gyrus is crucial for reading and writing (Bergmann, Hall, & Ross, 2007). Such portions of the brain are activated not only when a person is using his/her native language but also when learning a foreign language.

Language Teaching through Brain-Based Learning

The focus of this study is the implementation of the Brain-Based principles in English teaching since brain stimulation is necessary to be successful in any subject, especially foreign language acquisition. *The Cambridge's Dictionary* defines English as a foreign language (EFL) as "the teaching of English to students whose first language is not English" (EFL, 2015).

Learning English as a foreign language has become a need for communicating in today's world. Because of the importance that the English language has, several approaches in English teaching have been implemented for the purpose of facilitating the task of developing lessons according to

students' needs. For instance, the approach proposed by Caine and Caine called Brain-Based Learning, claims that brain stimulation is the clue to achieve the effective learning of English as a foreign language. This is similarly remarked by Haghighi (2012), "Brain based learning theory focuses on using research about how the brain works and how teachers can use this knowledge to help students learn English quickly and efficiently" (p. 509). Thus, one of the foundations used in Brain-Based Learning is having knowledge of the brain functioning in order to help students learn English as a foreign language under reliable procedures.

Brain-Based Learning

Brain-Based Learning focuses on *how* the brain functions to learn efficaciously. It is necessary for teachers to know first how the brain works when learning a foreign language. Only after knowing its way of functioning, instructors are able to choose the most suitable strategies to teach their students. In the next claim, Haghighi (2012) supported the fact that Brain-Based Learning embraces the assumption that the first step to learn is recognizing how the brain operates:

We already learn with our brain. What is the new thing? Caine's answer to the questions that may be asked by the people who have just heard about brain based learning is this: of course, all learning is brain based but if we say only learning, people may not understand what we have said. People have a brain which is wonderful and has infinite opportunities. So, while we are implying the brain based learning, we are interested in understanding how the brain works best and how we can increase the learning at the highest level. (p. 509)

This statement provides a clear idea of how essential it is to understand the way in which the brain learns to later implement appropriate BBL strategies such as peripheral stimuli, motivation,

movement, and activities that involve interaction, just to mention some examples, in order for the brain to experience direct stimulation. Thus, Brain-Based instruction provides the optimal conditions to improve the learning process in students through brain activation.

Brain-Based Learning is an approach that encloses the stimulation of the brain, body, and spirit as a whole, and not as separate elements in language learning. It is essential to be aware that elements such as brain and body work together when learning a foreign language. Actually, according to Samur, Tech, and Duman (2011), there is a linkage between mind and body. Senses are, as the word says, sensations occurred in the body, and “the senses give meaning to the stimuli in the mind” (p. 259). The senses are in charge of complementing what happens in the brain because this organ “only perceives the stimuli to which we give attention” (p. 259). Hence, the body boosts learning and complements the brain since both are necessary to learn. Moreover, there are twelve Brain-Based Learning principles that facilitate the task of teaching English as a foreign language through BBL.

Brain-Based Learning Principles

The twelve principles comprise the Brain-Based Approach and facilitate brain stimulation through the integration of mind and body. Caine and Caine (2000) emphasized that in order to identify essential general aspects of how a person learns, it is necessary to perceive the brain, mind, and body as a unit, which can be understood through the twelve Brain-Based principles. In other words, these principles are based on the idea that brain, body, and spirit have to work together when learning a foreign language. The twelve principles are listed as follows:

- 1) all learning engages the physiology;
- 2) the mind is social;
- 3) the search for meaning is innate;

- 4) the search for meaning occurs through patterning;
- 5) emotions are critical to patterning;
- 6) the brain processes parts and wholes simultaneously;
- 7) learning involves both focused attention and peripheral perception;
- 8) learning is both conscious and unconscious;
- 9) there are at least two approaches to memory;
- 10) learning is developmental;
- 11) complex learning is enhanced by challenge and inhibited by threat associated with helplessness and/or fatigue; and
- 12) each brain is uniquely organized. (pp. 3-9)

The Brain-Based Learning Approach then holds that body, mind, and spirit are entailed when learning a foreign language.

Principle 1. All learning engages the physiology. Taking into account all the physical senses gives students a global experience when learning. As said by Caine, Caine, McClintic, and Klimek (2009), “All students learn more effectively when involved in experiences that naturally call on the use of their senses, action, movement, and decision making” (p. 147). This is achieved by providing the learners with the opportunity to link vocabulary to physical action. Using music and movements facilitates memory. Drawing and making sculptures to represent information make learning meaningful and real.

Principle 2. The mind is social. Human beings have a need to relate to others in order to give and receive love, care, and empathy. Naturally, people influence each other with their behaviors and beliefs. Social interaction is a way to engage students, create communication, and take risks. Huen and Chan (2010) recommended to “arrange frequent pair-and-share activities, or

group work to foster students to work more cooperatively and learn from each other” (p. 148); thus, these activities empower students to face challenges in the personal and academic field since this connection brings confidence and motivation. Teachers use teams, role-plays, peer correction, and pair-work not only to improve pronunciation and fluency but also to become proficient, active, and competitive listeners and communicators.

Principle 3. The search for meaning is innate. Meaningfulness enhances relaxed alertness; relaxed alertness is when the brain has an optimal state for learning. The optimal state for learning is allowed when one finds purpose, understands, and connects what is being studied. To achieve what is being said, students have to relate the subject to their own life, knowledge, and interests. They need to experience a connection between the new ideas and the former knowledge. Then, understanding occurs when new information is synthesized and mastered; that is what teachers attempt. Educators can help students find their own connections by relating the subject to their lives, bringing stories, books, art, and metaphors, sharing experiences, and providing real life-like scenarios.

Principle 4. The search for meaning occurs through patterning. Patterning and learning are connected. As stated by Caine, Caine, McClintic, and Klimek (2009), “all human beings are driven by a need to identify, name, and organize the configuration of elements -or patterns- that make up their known world” (p. 163); thus, the brain perceives and organizes information. Patterns are “a particular way in which something is done, is organized, or happens” (“Pattern”, 2016). Patterns vary depending on the learner and they allow people to make sense of new subjects.

Principle 5. Emotions are critical to patterning. Emotions affect choices, reactions, and feelings. The brain is driven by emotions, which can be positive or negative. According to

Franks (2006), “emotion organizes its activity both enabling rational decisions and powerfully influencing cognition” (p. 59); therefore, learning is influenced by the emotions a person can have at the moment of exposure to the new content. Emotions are opportunities for learning, and the teacher can direct them toward the desired aim by inviting students to control their own learning, allowing them to have the opportunity to struggle, and encouraging them to develop their abilities. One role of the teacher is to engage students in the learning process by providing them with an optimal environment to enhance learning. An inspiring environment for learning, which includes hard work and joy, results in intrinsic motivation. Learning becomes more significant when joy is introduced through games that imply memorization of terms, enthusiasm by using new items such as puzzles and models, and awe, which is gained when experiencing inspiration. Students and teachers can work on self-awareness and self-understanding. The process starts with the teacher who deals with a group of emotional students. For this, educators must be emotionally settled to deal with their students’ emotions. One way to handle emotions is when the instructors address the class with “I” messages, which provides a sense of non-judgment for active listening. Emotions vary, and sometimes they are not easily identified; however, it is important to take into account that the teacher’s emotional tone will have a greater impact on the process. That is why educators must work on their own emotions to develop confidence and competence to deal with conflicts (negotiations). One way to deal with conflicts is to reward the students if they make improvements instead of using threats when their behavior is unsatisfactory.

Principle 6. The brain processes parts and wholes simultaneously. Language can be seen as a puzzle; one piece does not make sense by itself, but the pieces together show a whole that can be appreciated and understood. The pieces of the puzzle are information, facts, culture,

vocabulary, grammar, sounds, intonation, syntax, and more; through these pieces, the puzzle is displayed as a whole, and in this same way the language is presented as a whole. This is what the parts can do when put together, for example, music, poetry, and stories. Caine, Caine, McClintic, and Klimek (2009) stated that “making sense of experience requires both a big picture and paying attention to the individual parts. Teaching needs to begin with an experience for students that provides exposure to the overall nature of the subject” (pp.129-130); this experience of the whole is necessary in order to show learners what they can achieve. However, the parts lead students to understand significant information that covers the gaps in knowledge. Therefore, both the whole and details must be intertwined to learn more effectively.

Understanding components of a whole creates a sense of being competent, but without a clear picture, the learner does not know how to use them. Wholeness gives meaning to learning; this creates global experiences. The brain-based learning process aims at providing the whole in which the parts are exemplified, and at the same time, there is emotional attachment. In this way, students can make connections, think, and strive to go beyond. This process can be used in diverse subjects. Teachers can enhance this principle by introducing projects, simulations, innovative presentations, video clips, music, poetry, podcasts, and stories. The advantages are that students feel motivated, need to make decisions, become actors, and achieve mastery of the parts.

Principle 7. Learning involves both focused attention and peripheral perception. Paying attention to new information on purpose is critical to memory, but the context that surrounds learners also provides information for learning, even if attention is not intended. Thus, leading students’ attention to specific data allows them to understand new information since they are making an effort to center their attention on a focal point or amount of information, and they

know it. Accompanying focused learning with a meaningful context in which students can “place” learning and obtain information unwittingly results in a more holistic learning. Providing students with opportunities to learn by means of focused attention at the time that they are exposed to a peripheral insight covers and increases their learning capacity since “all students can learn more effectively when their attention is deepened and multiple layers of the context are used to support learning” (Caine, Caine, McClintic, & Klimek, 2009, p. 216). Thus, combining attention to content and perception to its context results not only in exposing students to new information but also in immersing them in new knowledge.

Principle 8. Learning is both conscious and unconscious. Some goals of learning are to acquire new information unconsciously and to be able to master it consciously. These processes might be deliberate or involuntary. Teachers and learners can make unconscious learning become something conscious; that means that students would not only learn but also understand what and how they learn; that is called metacognition. For metacognition or conscious learning to occur, students need time to reflect on their own learning. Moreover, as established by Caine, Caine, McClintic, and Klimek (2009), making learning conscious is the ability to observe one’s performance in order to evaluate what is occurring during the process. One strategy that teachers might implement to advocate conscious learning is to provide learners with opportunities to express new perceptions that they have acquired. Questioning also helps students to reflect on their own learning.

Principle 9. There are at least two approaches to memory. The first approach is archiving or memorizing isolated facts, skills, and procedures, and the other approach is engaging multiple memory systems in order to make sense of experience. Storing (archiving) is a traditional approach to learning in which teachers provide learners with information that must be

remembered. However, the second approach, engaging multiple memory systems, refers to the commitment to teaching students how to learn by using different means so that they make sense of experience. Memorization is explicit; it does not mean that it is incorrect, but if it is combined with making sense of what is being learned, it is easier to remember new information. As pointed out by Caine, Caine, McClintic, and Klimek (2009) “all learners can learn more effectively when taught through experiences that engage multiple ways to remember” (p. 204). One example of memorization is to provide students with a list of words and ask them to study and remember them for the next class; students would probably repeat them, and write them many times until they remember them. On the other hand, providing students with a tongue twister, and also a story in which these words appear, would help them remember those words at the time that they are challenged with different techniques. Some students might remember the tongue twister, others the story, others both.

Principle 10. Learning is developmental. Teachers play an important role in helping students develop their full capacities and interest toward the class subject beyond the classroom. Thus, teachers need to be concerned about students’ previous knowledge and performance since this provides them with a framework to start building new knowledge. Learning is an ongoing process that does not stop in the classroom, but continues in other contexts to which the learner is exposed. Students make choices that correspond to their individual characteristics and preferences. These choices guide them to understand the class content in different ways. Caine, Caine, McClintic, and Klimek (2009) believe that learning is more effective when the individual is seen as unique in the developmental process. This means that learners are individuals capable of taking part in decisions concerning their own learning stage.

Developmental learning not only refers to the previous knowledge but also to the biological changes learners go through in the different stages of their growth. It is not the same to learn as a child, as an adolescent, or as an adult. Thus, teachers need to take into account the stage where students are at in order to empower them to execute judgment and reasoning, which enhance motivation, self-confidence, and significance in becoming competent learners. Choosing between working individually or in groups in specific assignments is an example of how learners may participate in decision making, and at the same time promote their confidence and capacity to be critical and understand their own needs. Students need opportunities to observe, decide, test, discover, and communicate. They need to be guided to discover their unique preferences to develop fascination with learning.

Principle 11. Complex learning is enhanced by challenge and inhibited by threat associated with helplessness and/or fatigue. According to this principle, students learn better if the conditions and environment they are exposed to during the learning process trigger relaxation. Actually, Caine, Caine, McClintic, and Klimek (2009) pointed at the fact that “all students can learn more effectively in a supportive, empowering, and challenging environment” (p. 35). Hence, when learners face stress, their attention, competence, and confidence are affected since they are focused on the factors that might be disturbing them. This does not mean that teachers cannot encourage challenges; actually, challenging students is positive since it would make them step forward and leave their comfort zone. Nevertheless, teachers should find and implement techniques that challenge students without making them feel threatened.

Principle 12. Each brain is uniquely organized. Einstein (as cited in Polka & McKenna, 2016) said that “everybody is a genius, but if you judge a fish by its ability to climb a tree, it will live its whole life believing it is stupid” (p. 4); unfortunately, this happens when students’

individual characteristics are not taken into account. Students need to know that they learn differently and are not required to be good at the same abilities to be successful. According to this principle, Caine, Caine, McClintic, and Klimek (2009) established that students learn more efficiently when their individual talents, abilities, and capabilities are involved. Although the learning process usually takes place in groups of students, teachers need to do research on learning styles, multiple intelligences, and personality styles so that all students attain their learning goals. Each brain is unique; not everyone has the same talents or is equally proficient in the same intelligences. Therefore, teachers who implement different techniques and respect individual differences allow all students to have access to learning.

Brain Activating Techniques

The BBL principles refer to the theoretical assumptions while the techniques are the principles set into practice during the lesson. These techniques can be used in class to reinforce students' brain stimulation in order to achieve effective language teaching and learning. Creating a safe climate for learning is the first step to put Brain-Based Learning into practice and, according to Boss (2011), "morning meetings, developmental discipline, and student leadership teams are among the strategies that can foster social and emotional learning" (p. 3). The second tip is to encourage growth mind-set. This tip helps students recognize their brains as powerful organs and motivates them to learn since "students who have a growth mind-set are more willing to tackle challenges, learn from failure, and see criticism as useful feedback rather than a reason to give up" (Boss, p. 4). The third suggestion is to emphasize feedback, which, as stated by Boss, is necessary for students to understand the corrections rather than to only know what is right or wrong. This author urged getting "bodies and brains in gear" and not as separate aspects of learning (p. 7). Indeed, it is necessary to start early since children have greater dexterity for

acquiring a language. Learners must embrace the power of novelty; Boss (2011) explained novelty as an attention-getter, which means, “changing routines, asking students to consider similarities and differences, field trips, or guest visitors all help to keep learning fresh” (p. 9). Hence, these recommendations might help teachers stimulate students’ brains and achieve language learning effectively.

To sum up, the study of the brain and its relation with language is an issue of interest for teachers and learners. By learning how the brain is organized and what parts are related to language, teachers can strengthen the parts of the brain linked to linguistic skills in order to produce and understand a new tongue. In an attempt to design a more detailed and specific method for activating the brain, Caine and Caine developed the Brain-Based Learning Approach, which provides twelve essential principles for teaching and learning. Based on these fundamentals, instructors can improve their teaching strategies when implementing optimal activities and conditions for learning a foreign language and awakening students’ interest. These principles, while executed holistically, work as a guide for teachers to reinforce students’ learning, and they simultaneously provide students with a tool to become fast and proficient learners.

Brain-Based Learning Implementation in the Academic Field

Studies on the BBL have been completed in education as a means to show its effectiveness. Theory on the subject of the BBL has provided a context to better understand this approach. Nevertheless, the results that the BBL had as the focus of research in academic subjects are the points that will provide information about its effectiveness in real contexts and practice. One of these studies was conducted in 2006 and 2007 on a group of students from the department of Social Sciences Teacher Education at Mugla University, Turkey, in the Faculty of

Education. The purpose of this study was to explore the effects of Brain-Based Learning on the academic success of students with different learning styles. According to Duman (2010), “BBL more significantly increased the students’ academic achievement when compared to traditional teaching method[s]” (p. 2095). Hence, the experimental group achieved a higher level of proficiency than the group exposed to the traditional process. Duman (2010) also mentioned that in the classrooms where Brain-Based is used there is an increase in the educational accomplishment. In this study, Brain-Based Learning was proven to be an efficient teaching tool in the everyday classroom.

Based on the review of the literature, it can be noticed that the gap in the knowledge of the Brain-Based Learning Approach has not been studied at UNA, Costa Rica, Sede Regional Brunca, Pérez Zeledón. This approach aims at integrating cognitive science and neuroscience with education. Also, psychology and education work together to understand relevant aspects of learning. For instance, the ideas of *Gestalt* and Perceptual psychology are developed in BBL. On the other hand, researchers such as Bruer, who supported the behavioral science, questioned the efficacy of the Brain-Based Approach, but educators who believe in it have become prepared and updated on studies that connect the brain to learning. Studies about the brain show that the brain is complex since it not only works to store information but also to direct all other functions of the body, including language. For instance, the auditory stimuli are received in the temporal lobe. Higher thinking and language production take place in the frontal lobe, and visual input is related to the occipital lobe. The Brain-Based Approach deals with the activation of the brain parts.

The focus of this study is to find possible gaps in the use of Brain-Based Learning principles that might be preventing brain activation and fill them in order to enrich the process of teaching and learning. In order to promote the BBL principles in class, it is necessary to have

knowledge of the brain functioning first. Managing information about Brain-Based Learning helps teachers and students direct learning of a foreign language towards a reliable procedure by providing optimum conditions to improve the learning process through brain activation. This approach incorporates the person as a holistic being, whose brain, body, and spirit are three in one, and not as separate elements in language learning. Caine and Caine proposed the twelve principles to equip not only teachers of English as a foreign language but also teachers of varied subjects to deal with the essential elements. Thus, the study of the brain is an issue of interest for teachers and learners who by understanding more about the brain's linguistic organization can reinforce these parts of the brain in order to produce and comprehend a new language.

Chapter Three: Methodology

Chapter Three seeks to describe the qualitative methodology used to answer the research questions stated in Chapter One. In order to address these inquiries, the chapter shows the research design that guides this investigation. Site selection and participant selection of the study are then detailed. The role of the researcher, data collection, building dependability, and the procedures to analyze the data gathered are also specified. Finally, the chapter concludes with a schedule that organizes the entire research process chronologically.

Research Design

The present research project holds a qualitative nature since it focuses on matters related to understanding the meaning that humans or groups assign to a social problem (Creswell, 2014). In other words, this type of research is flexible and allows changes during the process. The data gathered are mainly analyzed qualitatively instead of numerically. Denzin and Lincoln (2011) defined this type of research in the following way:

Qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret phenomena in terms of the meanings people bring to them. Qualitative research involves the studied use and collection of a variety of empirical materials [...] that describe routine and problematic moments and meanings in individuals' lives. (pp.3-4)

Therefore, qualitative research observes the natural environment of individuals who are unpredictable and whose interactions are constantly changing.

The qualitative approach is selected because the researchers aim at doing a set of observations of the instructive practices related to the Brain-Based Approach in the Bachelor's Degree in English Teaching at UNA, Costa Rica, Sede Regional Brunca, Pérez Zeledón.

Additionally, qualitative studies are conducted in different directions; specifically, this investigation comprises a case study design, which Creswell (2014) delineated as “a design of inquiry found in many fields, especially evaluation, in which the researcher develops an in-depth analysis of a case, often a program, event, activity, process, of one or more individuals” (p. 14). Hence, the individuals to be observed and questioned are EFL teachers who are suitable to help the researchers gain knowledge that will upgrade the EFL teaching process. In the same way, their students will provide reactions and information that will serve as a complement to the data gathered from teachers.

Site Selection

The setting of the study is the Foreign Languages Department at UNA, Costa Rica, Sede Regional Brunca, Pérez Zeledón. This department offers the Bachelor’s Degree in English Teaching, which includes the course English Integrated Skills I in the first year. This university was founded in 1973. Based on the Universidad Nacional’s Registry Department, in 2016, Sede Regional Brunca, Pérez Zeledón enrolled 1037 students for the first semester, out of which 36 students started the Bachelor’s Degree in English Teaching. In the second semester of 2016, 35 students continued in the program. The main goal of this institution is to develop investigation programs and projects as well as to form professionals with social and humanist awareness (UNAWEB, 2015). In conformity with the course program of English Integrated Skills I, teachers use the eclectic and communicative methods. Praveen (2013) explained that “the eclectic method is a combination of different method[s] of teaching and learning approaches” (p. 1); thus, teachers tend to use aspects of diverse methods that fit the lesson objectives and students’ needs. On the other hand, “communicative language teaching sets as its goal the teaching of communicative competence” (Richards, 2006, p. 2); this approach fulfills holistic

objectives in which communication is the main goal. Both approaches are widely accepted as effective methods to reinforce the four language skills.

Participant Selection

The participants in this study are four EFL professors that teach the course English Integrated Skills I in the Bachelor's Degree in English Teaching at UNA, Costa Rica. For the sampling procedure, 20 students of each group were chosen by convenience to represent the entire target population; being 40 the total number of students. In the case of the four teachers, the choice was one of convenience, which selects participants who meet the study criteria and provide reliable information to answer research questions. As a result, they were suitable for the investigation because they taught the course under study. The four teachers observed were reached out to personally and through online correspondence in order to conduct interviews and questionnaires and do observations. In this program, teachers differ in age, gender, and level of education, but all of them are Universidad Nacional's former alumni. Two men and two women constituted the teachers in charge of groups 80 and 81 from the Bachelor's Degree in English Teaching, first semester, 2016. The teachers responsible for group 80 will be represented as P80 L/S/R for the Listening/ Speaking/ Reading class, and P80 G/W for the Grammar/ Writing class. Also, the instructors teaching group 81, will be assigned the codes P81 L/S/R for the Listening/ Speaking/ Reading class, and P81 G/W for the Grammar/ Writing class.

First, P80 G/W has a Bachelor's Degree in English Teaching and a Licentiate's Degree in Applied Linguistics from Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón, where she is currently working as a professor. She has also taught at CI-UNA English Access Micro-scholarship Program from 2013 to 2016. Secondly, P81 L/S/R holds a Bachelor's Degree in English Teaching and a Licentiate's Degree in Applied Linguistics from Universidad

Nacional, Costa Rica. She has worked for Centro de Idiomas, Universidad Nacional (CI-UNA) since 2012 and for Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón since 2013. She is currently working for the program CI-UNA English Access Micro-scholarship. In addition to this, she works as an English instructor for Universidad Estatal a Distancia (UNED) in an instructional program for elders. The next professor is P81 G/W who has a Bachelor's Degree in English Teaching and a Master's Degree in Second Languages and Cultures with Concentration in English from Universidad Nacional, Costa Rica. He began working as a teacher of English at Liceo Nocturno de Pérez Zeledón where is still working. He has been a professor at Universidad Nacional since the end of the year 2003, and his research interests include writing and grammar. Finally, P80 L/S/R has earned a Bachelor's Degree in English Teaching and a Licentiate's Degree in Applied Linguistics at Universidad Nacional de Costa Rica. Also, he holds a Master's Degree in TESOL from Indiana University of Pennsylvania and a PhD in Second Language Studies from Indiana University, Bloomington. He worked for Escuela y Colegio del Valle (2001) and Colegio Científico de Costa Rica, Brunca Extension (2002-2004). Some of the universities where he has taught in Costa Rica are Universidad Latina, Pérez Zeledón Campus (2002-2004) and Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón (2001-2004). P80 L/S/R has been a teacher of Spanish as a foreign language at Indiana University, Bloomington, (2006-2010; 2013-2014). Furthermore, he worked as an ESL professor for the same university in the Intensive English Program (2008-2010). P80 L/S/R has worked for CI-UNA as an EFL teacher (2013) and as a visiting assistant professor in the Department of Linguistics at University of Illinois, Urbana-Champaign (2014-2015). He has been teaching English as a foreign language at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón since 2015.

Added to that, these professors are in charge of fulfilling the Foreign Languages Department's main purpose, which is to provide students with language skills that enable them to use the language dynamically and effectively. English Integrated Skills I, the course on which this research will be based, reinforces the four linguistic skills. This course is divided as follows: listening, speaking, and reading for one segment and writing and grammar for the other. Although they are taught separately, they are intertwined for the purpose of attaining overall competence. For some students, this class represents the first intensive English course that they have taken. The difficulty and anxiety of learning a foreign language for the first time may result in dropout. Therefore, for this course, instructors might use a wide range of strategies, materials, and techniques to stimulate students' brain and foster motivation.

The students taking the course under study are participants who provided valuable information and responses during the development of the class and through a questionnaire that will support the other instruments. The individuals provided not only answers but also reactions towards teaching. The participants' gender varies since male and female students participate in the class. Their ages range from 17 to 25. Since they are full-time students, most of them do not work. Some of them receive financial aid, depending on their socioeconomic status. The course schedule for Group 80 is every Monday, Wednesday, and Friday from 1:00 p.m. to 4:40 p.m. with the professors P80 L/S/R and P80 G/W. The course schedule for Group 81, taught by professors P81 L/S/R and P81 G/W, is every Monday, Wednesday, and Friday from 8:00 a.m. to 11:40 a.m.

Role of the Researchers

The role of the researchers in this qualitative study is that of a primary instrument for garnering data since they are observers. The observers are non-participant (they are not directly involved in the situation) since they notice specific behaviors from outside. Therefore, the researchers do not affect the natural environment. The participant characteristics are known to the researchers due to the fact that the investigation requires foreign language learners and teachers from the first year in the Bachelor's Degree in English Teaching program, at the same university and under similar conditions. The researchers' role is to answer the research questions by gathering sufficient data about the implemented principles, the teachers' impressions regarding the twelve Brain-Based Learning principles, and further suggestions that might improve EFL classrooms. This is possible by means of the administration of different instruments such as observations, questionnaires, and interviews. The implementation of the instruments allows the researchers to be objective and describe the environment as effectively as possible, as well as to provide applicable solutions for the course studied if it is discovered that they are needed.

Data Collection

The data was gathered through four different instruments: two questionnaires (teachers and students), an individual interview for professors, and observations. This set of instruments is suitable for the purpose of the investigation because it is aimed at collecting essential information about the research topic in a clear and practical way.

Non-participant observations (Appendix A). In qualitative research, observations are essential because they “allow researchers to formulate their own version of what is occurring, independent of the participants” (Gall, M., Gall J., & Borg, 2003, p. 267); thus, observers witness

directly how participants behave in a natural context and not what their perceptions about the topic under study are. The data were descriptive, based on what the observers heard and saw. These impressions included comments, opinions, ideas, and phrases used in class, which were necessary to answer questions established in the observations. Such questions were designed to verify the implementation of the Brain-Based Learning principles. The nature of the observations was non-participative so that the researchers could become familiar with the contributors and setting. The observations took place during the first semester of the year 2016, from February to June. Each of the four professors teaching the course English Integrated Skills I in the Bachelor's Degree in English Teaching at UNA, were observed for twelve sessions; this was a total of forty-eight sessions during the semester. The number of observations was apt to gather enough information that supports and covers in-class strategies based on the Brain-Based Learning principles. In case that teachers used the principles, the observers would jot down the instructor's practices and the times that every principle was implemented.

Questionnaire for students of English Integrated Skills I course (Appendix B). The student questionnaire aims at obtaining information from the students' perspective about activities that the professors implemented in the course. Thus, through the activities that students described as part of the course, the researchers were able to analyze which of the Brain-Based Learning principles were implemented and how. The first part mentions the BBL principles, which were classified by students using the Likert Scale, for the purpose of specifying the frequency in which each principle occurred throughout the course. The indicators are illustrated as follows:

- Never=not implemented
- Hardly ever=once a month

- Sometimes=twice a month
- Usually=three times a month
- Always=four or more times a month.

In the second part of the questionnaire, students reflected on the activities implemented by the professors of the course English Integrated Skills I. Students were given a set of activities to specify the ones that encourage them to learn more efficiently and why. Twenty respondents from each group were selected randomly to answer the questionnaires. The total number of participants was forty students, who answered the questionnaires at the end of the semester. The collaborative instructors provided the researchers with time during class for instrument administration.

Questionnaire for teachers of English Integrated Skills I course (Appendix C). The teacher questionnaire gathers information about previous knowledge and the implementation of the Brain-Based Learning principles. The purpose is to obtain the professors' insights about Brain-Based Learning principles. The questionnaires were mailed, and the researchers ensured that the respondents had sufficient time to answer within a brief period, taking into consideration their schedules. The first part of the questionnaire for teachers contains closed-ended questions that result in direct answers about the extent in which they believe that the principles are important aspects to take into account when teaching. The questionnaire does not contain technical language about the BBL principles, so that instructors would be able to understand and provide answers even if they had no previous knowledge about this approach. The information was provided using the Likert Scale as a categorizer to evaluate the degree of importance that every statement included has for interviewees. The indicators are estimated from 1 to 5 as follows:

- Not important = 1
- Somehow important = 2
- Important = 3
- Very important = 4
- Extremely important= 5

The second part has open-ended questions, which deal with activities that they implemented in their class in accordance with the principles. Therefore, professors would indicate an effective activity that they could use for every one of the twelve principles. This questionnaire evinced the professors' understanding and practices about the topic under study.

Interview for teachers of English Integrated Skills I course (Appendix D). The interviews allowed researchers to gain in-depth understanding of professors' practices according to their own perspective. This is first-hand information that researchers used in order to probe the different interviewees' responses based on their insights, opinions, experiences, and concerns about the topic. This interview was administered to teachers personally at the end of the cycle. During the administration of this instrument, when the participants provided their responses, the interviewers had the opportunity to record the conversation. Also, spontaneous questions emerged to enrich the content and understanding of the investigation. The instrument first introduced the topic and the participants' previous knowledge of it. Then, they were asked to explain which principles they had implemented during the time observed and how. Additionally, they mentioned the activities that they implemented and consider effective to activate students' brain during the course. The interviews were designed to last approximately thirty minutes in order to register all the necessary remarks that the professors provided.

Building Dependability

Triangulating information allow researchers to draw conclusions from different sources and participants. This is a recommended practice for researchers in every field of study because the possibility of doubts and errors is diminished. Thus, the information gathered was triangulated to ensure reliability and validity of the analysis. These two factors must be taken into account when conducting a research. Reliability is defined as a concept that has the purpose of generating understanding (Golafshani, 2003). Reliability assures that the quality of the result of a research will not change. The results are consistent over time as well as the representation of the participants. This means that regardless the time, the study will have no significant variation in the product. Golafshani stated that reliability is achieved when elements such as inspection of primary data, data analysis, and progress records authenticate the stages of the investigation.

Secondly, validity in qualitative research is also an elemental tool that provides trustworthiness. Creswell (2014) explained that validity “is based on determining whether the findings are accurate from the standpoint of the researcher, the participant, or the readers of an account” (p. 191); thus, validity allows the reader to verify the precision of the study. Validity relies on the vastness of resources considered necessary in the methodology of the research. Therefore, to attain dependability, information and results were organized according to the research questions stated in Chapter One. Creswell mentions that some procedures are checking transcripts, comparing data with the codes, having regular documented meetings, and sharing analysis. For a better understanding, the data triangulated was clearly represented through the use of figures, tables, descriptions, and any other required procedure.

Data Analysis

This research follows a constructivist paradigm based on a qualitative study; consequently, the data gathered during the development of this investigation were analyzed and interpreted according to the constructs derived from the research questions that guide this study. In order to fulfill this purpose, figures, tables, and descriptions are used in order to provide statistics obtained from the observations, questionnaires, and typed transcriptions of interview sessions. The instruments mentioned were administered to professors of the English Integrated Skills I course in the first year of the Bachelor's Degree in English Teaching program. The constructs established by the research questions are examined as follows:

Principles of the Brain-Based Learning Approach implemented by the professors of the English Integrated Skills I Course in the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón. The outcomes obtained from the observations provided evidence of the Brain-Based Learning principles practiced by EFL professors teaching the English Integrated Skills I course in the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón. This information was triangulated with the interviews and questionnaires gathered by the researchers, who strove for consistency when exploring the professors' techniques. Every technique used by the instructor was noted down in order to analyze the correspondence among what teachers said that they did, what students said the professors did, and what they actually did in class to trigger students' interest and brain awakening. This is, for example, not only about the implementation of icebreakers and games but also through the focus on implicit and explicit factors that require effective learning.

Impressions that the professors of the English Integrated Skills I Course in the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón have regarding the twelve Brain-Based Learning principles. The instructors teaching the course English Integrated Skills I expressed what they understood and how informed they were about the Brain-Based Learning principles. This information was gathered through a questionnaire, an interview, and observations. The questionnaire includes a section of closed-ended questions in which each question displays a principle of the approach. These questions led professors to provide answers according to their perceptions of the subject under study. The professors were also interviewed on the principles that they were familiar with in their teaching context so that they expressed their opinions and beliefs about this topic. The interview allowed researchers to gather spontaneous responses about how important each principle was for them while the questionnaire asked directly which principles they implemented in class. Also, observations demonstrated if the instructors put into practice what they believed was important according to the other two instruments. Thus, the implementation of these three different instruments allowed the triangulation of the information in order to assure its congruency.

Suggested strategies for professors to activate students' brain during the English Integrated Skills I Course in the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón. The investigators examined what Brain-Based Learning strategies were suitable for students in the first year the Bachelor's Degree in English Teaching. This analysis included some strategies already used by the teachers, and some that needed to be implemented when enhancing learning and brain awakening. Triangulation took into account students' and teachers' contributions through the questionnaires

and the interview (teachers). Also, what the observers witnessed in class-time worked as a complement to pursue the goals established by the principles. The strategies that as a result of triangulation were found effective were be the basis of a proposal to encourage conscious learning and teaching. This action plan will serve the purpose of implementing the Brain-Based principles in the lessons concerning the contents required when teaching the English Integrated Skills I Course.

Research Schedule

Throughout this investigation, it will be necessary to follow an organized schedule to accomplish the research project on Brain-Based Learning principles in the Bachelor’s Degree in English Teaching at Universidad Nacional, Costa Rica. This timetable illustrates the processes of the investigation:

Research Schedule																								
Procedures 2016	January				February				March				April				May				June			
	Weeks																							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Permissions							✓																	
Introduction							✓	✓	✓	✓														
Literature review																			✓	✓	✓	✓	✓	✓
Methodology																			✓	✓	✓	✓	✓	✓
Administration of questionnaire to students																			✓	✓				
Administration of questionnaire to teachers																					✓	✓		
Conducting administration of interview to teachers																					✓	✓	✓	✓
Observations (group 80 and group 81)						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Procedures 2016	July				August				September				October				November				December			
	Weeks																							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Literature review	✓	✓	✓	✓	✓	✓	✓	✓	✓															
Methodology				✓	✓	✓	✓	✓	✓	✓	✓	✓												
Data description											✓	✓	✓	✓	✓	✓								
Data analysis																	✓	✓	✓	✓	✓	✓	✓	
Procedures 2017	January				February				March				April				May				June			
	Weeks																							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Data analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓															
Conclusions and recommendations										✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Action Plan													✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Procedures 2017	July				August				September				October				November				December			
	Weeks																							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Conclusions and recommendations																								
Action Plan	✓	✓	✓	✓	✓	✓																		
Design and reviewers' revision						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
Final edition																	✓	✓	✓	✓	✓			
Procedures 2018	January				February				March				April				May				June			
	Weeks																							
Presentation			✓																					

Chapter Four: Data Analysis and Interpretation

The purpose of this qualitative research was exploring the Brain-Based Approach principles implemented in the course English Integrated Skills I, in the first year of the Bachelor's Degree in English Teaching at NA, Costa Rica, Sede Regional Brunca, Pérez Zeledón. Chapter Four presents the analysis of the data collected from the four instruments administered to the participants of the study. This information was triangulated in order to answer the research questions stated as the core of this investigation. The triangulation was developed from the answers obtained from questionnaires (for teachers and students), an interview to teachers, and non-participant in-class observations. The questionnaires contained the same principles adapted to teachers and students as the participants of the study. The interviews facilitated responses and perceptions that teachers had about the topic under study. Additionally, the observations were conducted during forty-eight sessions, precisely, twelve sessions per each one of the four professors.

The research questions established in the investigation were a guide to triangulate and classify the information derived from the instruments administered to the participants. The analysis made the identification of Brain-Based Learning principles possible in activities and techniques used by teachers of the course English Integrated Skills I, in the first year of the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón. Also, the examination allowed the researchers to obtain students' and teachers' perceptions concerning the Brain-Based Learning principles and the effects that they have when implemented in class.

Principles of the Brain-Based Learning Approach Implemented by the Professors

The non-participant observations allowed the researchers to witness the implementation of the principles that constitute Brain-Based Learning. These non-participant observations define instrument one, and were conducted in the first semester of the year 2016 in the course English Integrated Skills I in groups 80 and 81. Twenty-four sessions were observed in the Listening/ Speaking/ Reading class and twenty-four sessions in the Grammar/Writing class; which are the two branches that compose the course. It was confirmed throughout the observations that all the

Table 1.

Implementation of Brain-Based Principles Observed in Class

	Grammar/ Writing		Listening/Speaking/Reading		Global	
	Number of times	Percentage	Number of times	Percentage	Number of times	Percentage
Principle 1	8	4%	9	4%	17	4%
Principle 2	14	6%	28	11%	42	9%
Principle 3	21	9%	15	6%	36	8%
Principle 4	25	11%	30	12%	55	12%
Principle 5	20	9%	25	10%	45	10%
Principle 6	7	3%	12	5%	19	4%
Principle 7	12	5%	7	3%	19	4%
Principle 8	24	10%	23	9%	47	10%
Principle 9	12	5%	12	5%	24	5%
Principle 10	20	9%	28	11%	48	10%
Principle 11	23	10%	21	9%	44	10%
Principle 12	43	19%	37	15%	80	17%
Total	229	100%	247	100%	476	100%

Note. This table displays in detail the number of times in which the twelve BBL principles were implemented in class. These data were taken from instrument one, non-participant observations.

principles were put into practice at some instance by instructors (see Table 1). The non-participant observations served as a means to notice the frequency with which each of the principles was implemented in class and how (activities). One of the results derived from instrument one showed that Principle 12 (each brain is uniquely organized) was the most implemented in the Grammar/Writing class, with 19% application rate. Principle 12 was also the one with the most implementation in the Listening/Speaking/Reading class, with 15% application. Thus, professors showed concern about the individual differences of students in the two classes that they teach.

There were some principles that were hardly implemented in the Grammar/Writing course. The least implemented principles in this class were Principle 1 (all learning engages the physiology) and Principle 6 (*The brain/mind processes parts and wholes simultaneously*), with a 4% and 3% respectively. As for the results of the principles' implementation in the course, putting together the two classes that are taught (Listening/ Speaking/ Reading and Grammar/Writing), the observations stated that the principle that was implemented the highest number of times had 17% of implementation, and that was Principle 12, which refers to different learning styles and multiple intelligences. On the other hand, Principle 1 (*all learning engages the physiology*), Principle 6 (*the brain processes parts and wholes simultaneously*), and Principle 7 (*learning involves both focused attention and peripheral perception*), were the least implemented, with 4% each. This means that Principle 1 (movement as a means to stimulate the brain, for example, physical games), Principle 6 (global experiences that allow the brain to process details and wholes such as projects, music, simulations, innovative presentations, and stories), and Principle 7 (posters, and other materials that trigger peripheral stimuli); were not strongly developed in class.

It is essential for teachers to find the way to obtain insights from students since they have different perceptions. There are some principles that may be implemented as a means to activate students' brain and benefit their learning. However, it is necessary to examine the students' own perceptions since they can make great contributions for teachers to implement more and different techniques in class. Thus, the questionnaire for students, instrument two, sought the frequency of implementation of the Brain-Based Learning principles in the course English Integrated Skills I, from students' perspective. Students were given a set of questions, in which each of the principles was described using simpler definitions than the ones used for teachers, so that it was more appropriate for their level and understanding. The students that completed the questionnaire were forty, and they had to choose a number from one to five according to how frequently each principle was implemented in class. Principle 12 (*each brain is uniquely organized*) was considered usually implemented by the 50% of students (see Figure 1), which

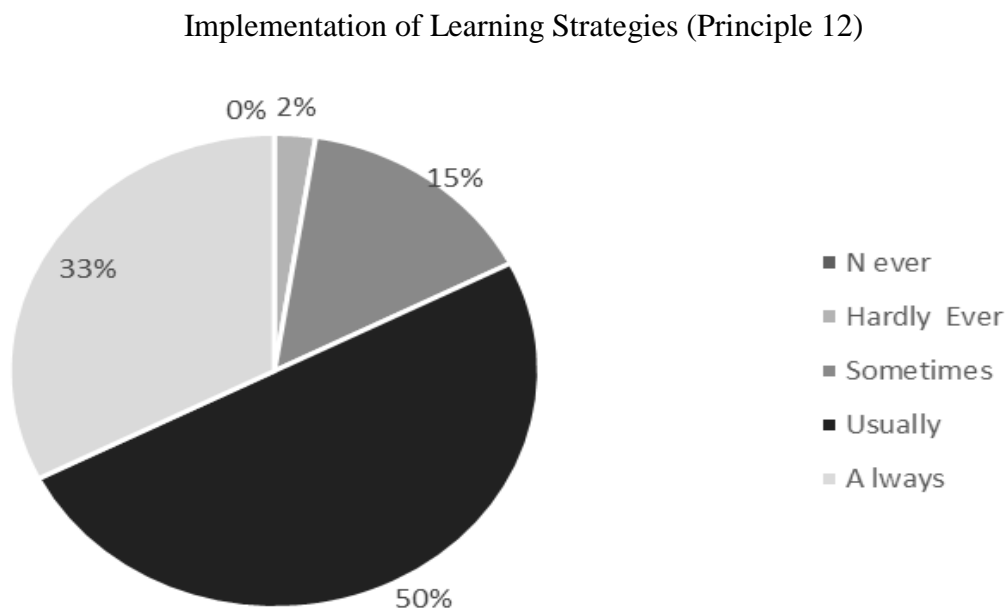


Figure 1. Implementation of Learning Strategies (Principle 12). This graph shows the frequency of learning strategies implementation in the course English Integrate Skills One. Information obtained from Instrument 2: Questionnaire for Students.

shows agreement between teachers and students. Students considered that teachers took into account their different learning styles and brought different activities into the classroom. Also, 70% of students agreed when they said that Principle 10 (*learning is developmental*) is always practiced in class. Thus, students stated that new topics are explained step by step all the time, respecting learning stages. Principle 3 (*the search for meaning is innate*) also had 50% of students' consent. For principle 3, students were asked if class activities took into account their interests, purposes, and ideas. Half of them were positive about it and considered that the course took into consideration aspects that were functional and interesting to them.

Instrument two showed that 55% of students stated in their answers that the course English Integrated Skills I always made them improve their English daily (first aspect from principle 11). More than half of the students (55%) assured that aspect two from Principle 11 (*complex learning is enhanced by challenge and inhibited by threat associated with helplessness and/or fatigue*) was always implemented, proving that their performance is greatly influenced by how they feel in class, and that a threatening environment might prevent them from achieving

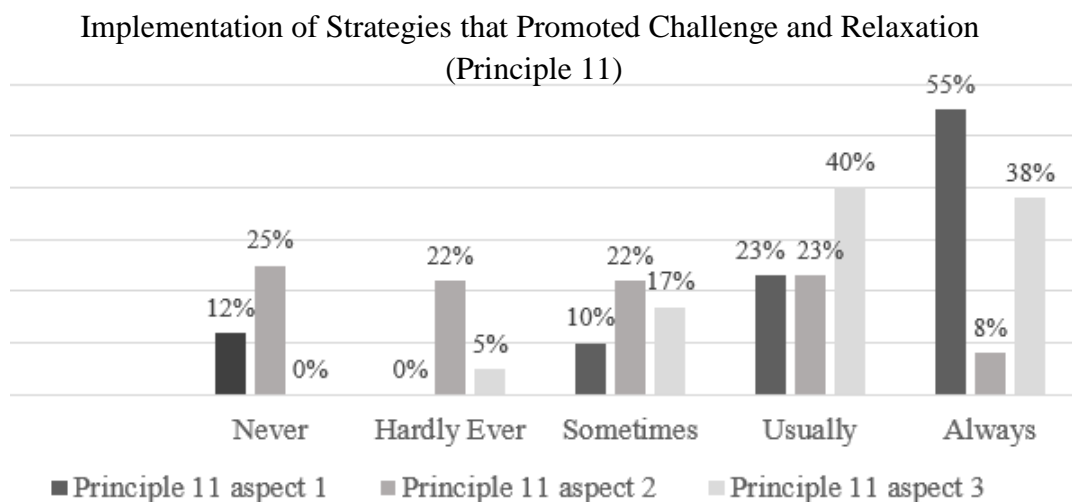


Figure 2. Implementation of Strategies that Promoted Challenge and Relaxation (Principle 11). This graph shows the frequency of strategies that reduce the stress on students in the course English Integrate Skills One. Information obtained from Instrument 2: Questionnaire for Students.

optimal learning, while a relaxing environment would stimulate them to learn and participate effectively (see Figure 2). Although half of the teachers (50%) acknowledged that preventing students from feeling threatened is extremely important, 23% of students acknowledged that there is usually stress in the classroom and that they feel anxious, while 25% have never experienced anxiousness, and only 8% of them always feel stressed. Teachers also mentioned in the interviews that they have tried to prevent students from feeling threatened in class by telling jokes, smiling, or motivating them by using compliments and explaining to them that making mistakes is not bad, but it is necessary to correct them.

The instructors also provided their answers in instrument four, the interview for teachers. This interview was administered in order to discover if they agreed with the idea that they implemented the BBL principles in class, which ones, and how often. All the teachers pointed at the facts that they implemented most of the principles in class. However, there were principles that were not implemented as often. Instructor P81 G/W expressed that he does not present the big picture (context) in relation to details. He explained, "I need to cover all the topics in a hurry all the time, so it's difficult to include these types of activities" (Principle 6). Although time is a central aspect, and is usually out of the instructors' hands, providing students with a context when teaching a new topic might actually save time as the class is developed. Additionally, the same teacher was not sure about using unconscious learning in his class; he said that he may not realize if students are developing their own mental processes since the games that he plans are for students to practice structures and learn consciously (Principle 8). However, during the observations of this class, songs and games were used, these activities actually allow students to practice grammatical structures unconsciously.

All the teachers expressed in the interview that they did not know about the BBL. However, they were applying some principles, which shows that there was unconscious implementation of BBL. If instructors were aware of the BBL principles and activities that serve their implementation, they could use them more effectively as a useful tool to activate students' brain. This teacher mentioned that he used the techniques that were useful for him as a student. Therefore, he is not sure that the activities that he implemented were effective for all the different learners, but were effective for the ones that have the same learning styles as him; he also pointed at the fact that that he focused on visual learners, probably because he is visual as well. However, Principle 12 states that each brain is uniquely organized, and the teachers did recognize its importance in the questionnaire for teachers.

Teacher P81 L/S/R stated that she did not categorize new information into patterns during this course since the Listening/Speaking/Reading class was not content based (Principle 4). Teacher P80 L/S/R revealed in the interview that it was difficult for him to take into account students' interests, purposes, and ideas to engage them (Principle 3). This instructor mentioned that the topics are already established in the textbook that is used in class, and some of these topics might be interesting to students, but some others are not. However, he added, "I would bring pictures and things, I would try to bring something that was probably interesting for them, but the problem is I cannot, I don't think that you can please all the students." P81 L/S/R said that when he was a young teacher, he projected a positive attitude to motivate his students. However, through time he learned that it is not what students always need. He tried to be direct and focused on the content instead of motivation, since motivation should be more intrinsic, or triggered by students themselves at higher education (Principle 5). Thus, the principles that were least implemented in the course were principles three, four, five, six, seven, and ten (see Figure

3). These principles were hardly achieved during that semester since these principles represent meaningful learning, patterning, emotions, parts and wholes, focused attention and peripheral perception, and developmental learning. According to the L/S/R teachers of both groups, these principles seem not to fit the nature of the curriculum taught in this course.

The results from the interview directed to instructors stated that the principles that were implemented the most in the course English Integrated Skills I were Principle 8 (*learning always involves conscious and unconscious learning*), Principle 9 (*there are at least two approaches to memory: archiving isolated facts and skills or making sense of experience*), and Principle 11 (*complex learning is enhanced by challenge and inhibited by threat associated with helplessness and/or fatigue*), with an implementation in class of 13% of each. However, in the questionnaire

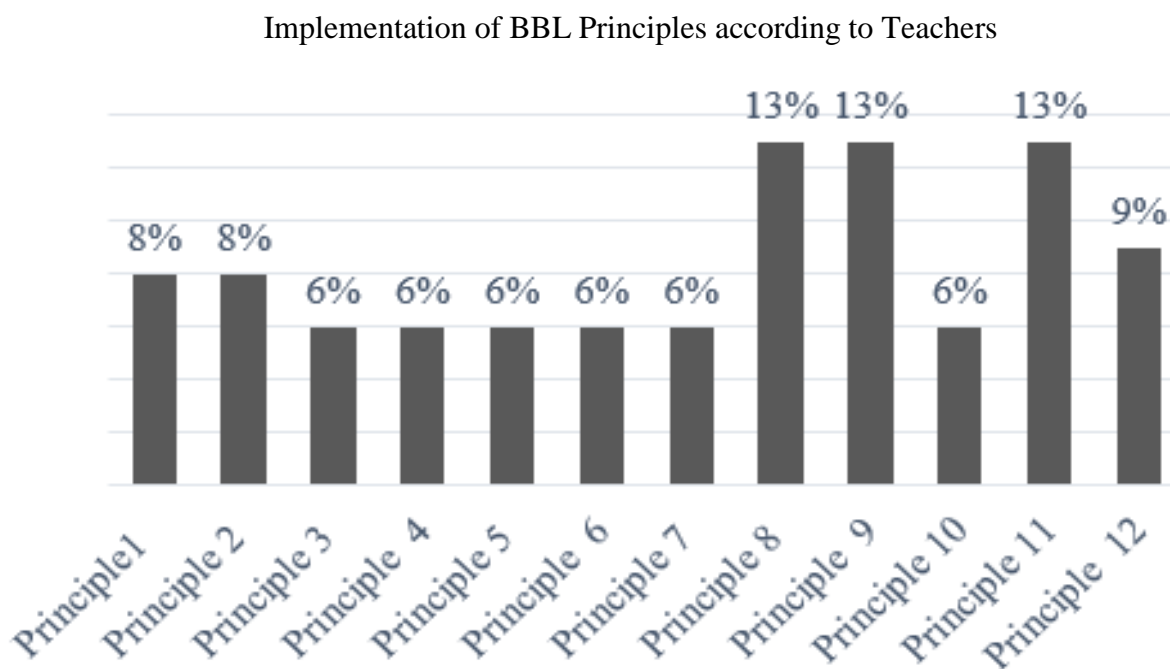


Figure 3. Implementation of BBL Principles according to Teachers. This graph shows the frequency in the implementation of the different principles in the English Integrate Skills One. Information gathered from Instrument 4: Interviews for Teachers

directed to teachers (instrument three), instructors concluded that the most important principle to be implemented when teaching is Principle 5 (*emotions are critical to learning*), with a 19% of importance (see Table 2). Moreover, all the instruments indicated that not all the principles were implemented a similar number of times. The most often implemented in the Grammar/Writing class was Principle 3 (*the search for meaning is innate*), with 20% implementation rate; this principle was also the one with the highest implementation in the Listening/Speaking/Reading class, but its percentage was 14%, which was the same for principle 5 (*emotions are critical to patterning*), and 11 (*complex learning is enhanced by challenge and inhibited by threat associated with helplessness and/or fatigue*). The principles that were least implemented were 1 and 6 in the Grammar/Writing class, with 3%, and Principle 7 in the Listening/Speaking/Reading class, with only 2% rate of implementation.

Impressions that the Professors Have Regarding the Twelve Brain-Based Learning

Principles

The data gathered from the questionnaires, the interview, and the observations displayed the impressions that professors of the course English Integrated Skills I in the Bachelor's Degree in English Teaching have regarding the twelve Brain-Based Learning principles. The different instruments showed the knowledge the collaborating teachers have about the approach under study, how important each principle is for them, and the connection that their impressions have with the implemented principles. First of all, in the interview administered to teachers, the respondents made it clear that most of them are not familiar with the brain and its functions. In fact, only one of the teachers mentioned that they had had some training related to the brain. One respondent said, "When we were in the major, we studied some theory related to that, but I mean, like to keep it in mind it is kind of hard;" thus, the training that teachers received included

some information about the brain. For example, in sociolinguistics, the parts of the brain related to linguistic abilities are taught. Moreover, some teaching techniques linked to the BBL principles are part of the teaching methodologies that instructors must use to achieve effective teaching skills. Additionally, the interview for teachers revealed that none of teachers have heard of the BBL principles. This means that this approach is not explored by the participants, and that whether they implemented the principles or not was not part of their purposive teaching strategies. The results revealed that even though this approach is unknown, professors identified some principles as “extremely important,” “very important,” “important,” and “somewhat important.”

In general terms, the teachers considered that all of the BBL principles have some degree of importance. Most of the principles were considered “very important” to be implemented in the EFL class. According to instrument three, the teacher’s questionnaire, data about the degree of importance that the collaborating teachers give to every principle were collected in order to understand how teachers perceive the BBL Approach (see Table 2). The BBL Approach takes

Table 2.

Criteria of Importance of the 12 BBL Principles

	Prin.1	Prin.2	Prin.3	Prin.4	Prin.5	Prin.6	Prin.7	Prin.8	Prin.9	Prin.10	Prin.11	Prin.12
Extremely Important	50%	75%	50%	0%	100%	0%	25%	12.5%	0%	25%	50%	25%
Very Important	25%	25%	25%	50%	0%	75%	25%	50%	62.5%	75%	41.7%	50%
Important	25%	0%	25%	50%	0%	25%	25%	12.5%	25%	0%	8.3%	25%
Somewhat Important	0%	0%	0%	0%	0%	0%	25%	25%	25%	0%	0%	0%
Not important	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note. This table shows the importance which teachers assigned to the BBL principles. These data were obtained from Part I of the teacher’s questionnaires.

into consideration aspects that current teachers might consider essential in their practices due to their experience and knowledge acquired since the first encounter with the foreign language as learners and as teachers. Some of these aspects are social interaction, motivation, categorization of information, focused attention, peripheral stimuli, memorization, challenge, confidence, learning styles, among others. The results showed that this approach is necessary for class development and that teachers might be willing to implement new techniques that enhance learning through BBL.

One aspect considered extremely important by all teachers is motivation when one is learning (see Figure 4). This corresponds to principle five, in which emotions are critical to patterning. To deal with the students' emotions, it is important for the teacher to transmit a positive attitude in order to elicit an optimistic reaction from students towards learning and willingness when they are challenged. This motivation might come intrinsically or extrinsically.

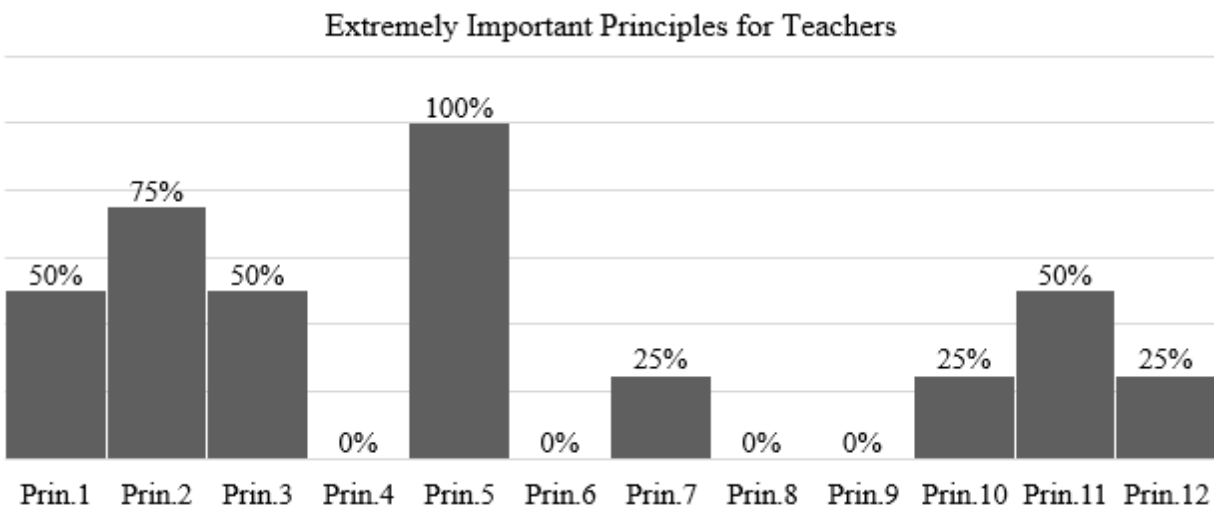


Figure 4. Extremely Important Principles for Teachers. Teachers provide their perceptions about the importance of the twelve principles. This information was obtained from Instrument 3: Questionnaire for teachers.

When students are intrinsically motivated, they have the determination and attitude to learn and become competent in the foreign tongue. For instance, during the observations, participating students tended to be motivated, and they showed excitement when they had to develop their skills. The kind of motivation that the teachers observed while trying to boost in their students, extrinsically, was displayed through games, the teacher's enthusiasm, grades, and prizes.

Teachers believe that this is the most essential element that must rule the lesson.

The data collected revealed that the principle that teachers implemented most often was not the most important for them (see Figure 5). Principle twelve, which deals with the learning styles, was given more importance in practice. During the stages of the lesson, the four teachers aimed at employing a variety of teaching styles and intelligences. For instance, some teachers

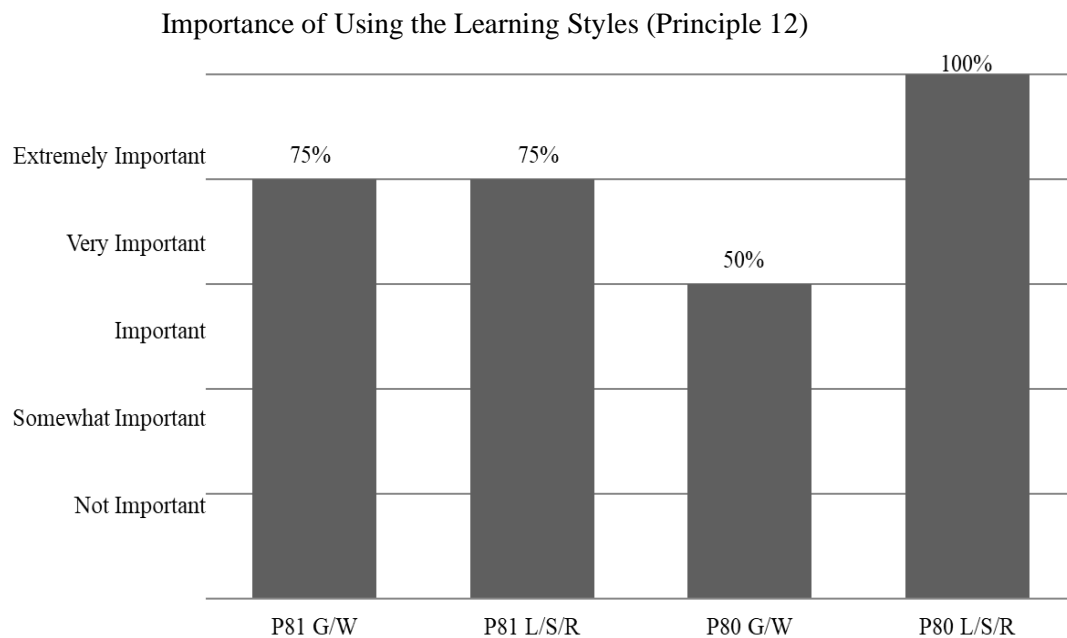


Figure 5. Importance of Using the Learning Styles (Principle 12). Teachers provide their perceptions about the importance of the twelve principles. This information was obtained from Instrument 3: Questionnaire for teachers

were observed to explain the content by showing a Power Point presentation, while others explained it on the whiteboard. Some teachers told stories, and others provided a text for students

to understand vocabulary. Other teachers played music that contained the grammar structure to be studied for musical students to understand and use it. Some students were observed to work in pairs, and others preferred to work alone. Teachers did not intend to have controlled practice all the time so sometimes students could freely choose how to work in class. This contradiction may be a result of what teachers believe must be practiced in class. The variety of techniques was not present in every class observed, but teachers truly intended to find the most appropriate way to help student internalize knowledge. Since the class size was big, the possibility of having a variety of types of students with different learning styles increases. Certainly, the Learning Styles is a theory supported by many experts in the field of education throughout the years, and the teachers were taught the importance of applying them in class. Moreover, it was observed that some teachers tend to give more importance to the style that describes themselves as learners. For instance, the most kinesthetic ones implemented activities that helped students move. Others enjoy reading; thus, this was evidenced while teaching. One of the teachers explained that he was not good at role-plays, and that is why he does not use them in class, but this teacher prefers to use class discussions. Therefore, the teaching methods are highly influenced by the way teachers learn. This does not mean that the same teaching method is used all the time, but it is mostly implemented. The collaborating teachers aimed to direct the different intelligences in most of the classes since, in general terms, they were considered important for effective teaching.

Out of the four teachers observed, two of them stated that principle one, which involves physiology, is extremely significant (see Figure 6). However, during the observations, it was the less practiced principle. Through analyzing the data, one teacher never used this principle in class, even when this teacher considered it very important. On the other hand, the teacher who

applied the principle most often indicated that it is extremely relevant. According to the observations, this principle was perceived most frequently implemented by P81 L/S/R (see Figure 7). This teacher implemented this principle in more than half of her classes during the time observed. The importance given to these principles might vary when the instructors differ in age, level of education, and experience. The observations proved that the two experienced teachers, who have taught for more than ten years, implemented this principle with less frequency. On the contrary, younger teachers, whose experience does not overpass five years, might be more enthusiastic about using principle one. The perception between the two groups of teachers regarding the importance of this principle is quite dissimilar. The use of principle one

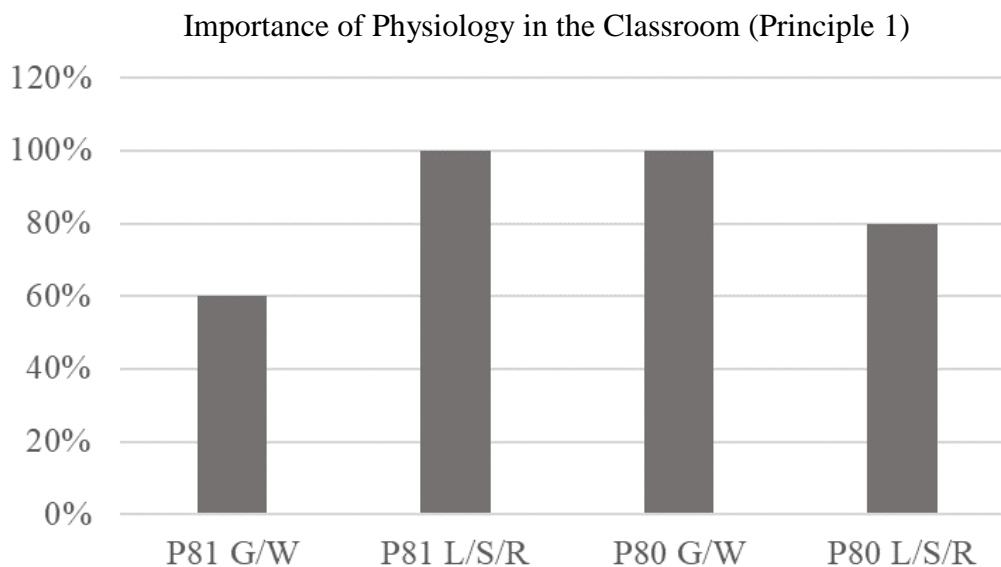


Figure 6. Importance of Physiology in the Classroom (Principle 1). This information shows how teachers categorized principle 1. This information was obtained from Instrument 3: Questionnaire for teachers.

makes a difference during the class environment since movement took action during the first minutes of the class. This was not the rule for all the classes; however, it was generally observed during the warm-ups. Some teachers mentioned that during the class period, time was a constraint which hindered extra-activities besides the ones used to cover the topics planned.

Therefore, the priority was to teach the content first, and other activities that included body movement were secondary. The effectiveness of physical movement during the teaching period is remarked by the BBL Approach, which affirms that spirit, body, and brain are connected. Thus, when learning involves the body, the rest of the organism is affected. It assumes that

All Learning Engages the Physiology (Principle 1)
Perceived in the Class of P81 L/S/R

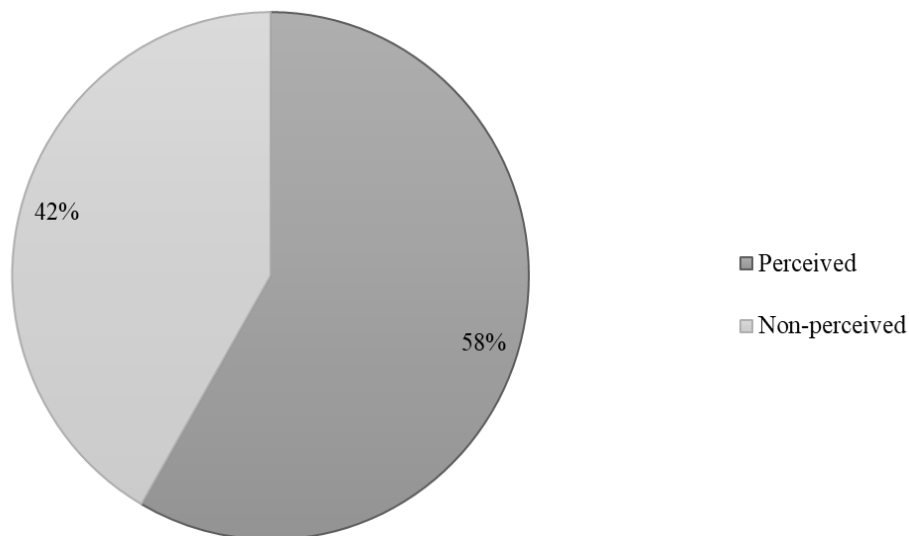


Figure 7. All Learning Engages the Physiology (Principle 1). Perceived in the Class of P81 L/S/R.. This figure illustrates how principle one is perceived in the teacher' class who implemented it more frequently. This information was obtained from instrument 1, the non- participant observations.

teachers who bring active teaching games are more effective. The two less-experienced teachers showed more interest in following principle one. According to King (2010), "Perhaps experienced teachers are not staying up on the latest curricular and pedagogical advances" (p. 5); consequently, younger teachers tend to be more updated with innovative activities that interest young students. This might result in different attitudes, practices, and beliefs that could bring additional novelty to the class in order to activate students' brains.

Suggested Strategies for Professors to Activate Students' Brain During the Course English**Integrated Skills I**

This investigation demonstrates through the students' questionnaire, the teachers' interview, and the observations what Brain-Based Learning strategies are appropriate for students in the first year of the Bachelor's Degree in English Teaching. Some recommendations were given by students who expressed their preferences when learning a foreign language. Students were not aware of the principles, but the descriptions were provided for them in order to make them understand what each principle consists of. The teachers talked about some effective activities during their experience to enhance learning and brain awakening. Also, the observers witnessed what teachers implemented in class and the students' reactions towards these techniques. The course English Integrated Skills I is structured in a way that grammar and writing are taught by one educator, while listening, speaking, and reading are taught by another teacher. The information about the techniques considered effective is divided into the two classes since they require different activities depending on the skills to be developed.

First of all, in instrument three, the teachers' questionnaire, they shared some techniques that they consider important to activate the brain. The Grammar/ Writing professors of both groups believe that the activities provided are attractive to students (see Table 3). Both teachers agreed on the fact that posters are useful, but they did not bring any to the class. Furthermore, they suggested different activities for each principle. For instance, one teacher motivates students by using quotes and videos that encourage them to be better, while the other respondent stated that he prefers prizes and positive reinforcement on tests. More than attractive, these techniques have been effective for the collaborating teachers when trying to reinforce the writing

Table. 3
Techniques Recommended by Teachers of the Grammar/ Writing Class

Principle	P81 G/W	P80 G/W
1	-hot potato	-Virginia's reel
2	-group work, roles plays	-debates, round tables
3	-role plays, crossword puzzles, prizes	-songs of their favorite singers
4	-diagrams, idea maps on board and notebook	-mind maps (grammar), short readings, summarizing
5	-prizes, positive reinforcement on quizzes and exams	-motivational phrases and videos
6	-popcorn activities, oral questions	-listening comprehension exercises
7	-posters, flashcards	-posters on the walls or a vocabulary bank on the whiteboard
8	-quizzes, fill-in the blank exercises competitions, group work, pair work	-warm-ups, reviews
9	-lists of vocabulary, word diagrams, charts, reading out loud	-rules explanations by using images, colors, and shapes -discovering the rule by looking for patterns in sentences provided
10	-following the writing process when writing, peer assessment and error analyses	-brainstorming ideas about the subject under study
11	-practices from books that have context, not simple drills -examples, occasional jokes, warm-ups (games, hangman, word searches)	-competitions -collaborative learning, learning their classmates' names, instrumental music while doing an exercise -cautious error correction, class- arrangement
12	-games where students listen and pick up the answer (that might be written on a piece of paper on the board)	-individual or group work activities. picture-talking, problem- solving, gap filling, minidramas, dialogues, writing short stories, word chains

Note. This table shows effective activities that match every principle of the BBL Approach for the Grammar and Writing class. The information is taken from instrument three, Part II of the teacher's questionnaire.

skill. On the other hand, the teachers of the listening/speaking/reading area recommended a set of techniques not very different from teachers P81 G/W and P80 G/W.

The teachers of listening, speaking, and reading have different techniques to deal with the implementation of each principle as demonstrated in instrument 3, the teacher's questionnaire (see Table 4). For instance, both agreed on having students working in groups to enhance the social abilities of students since, as one of the professors mentioned, negotiating meaning activates the brain. Additionally, both teachers reasoned that grammar and phonology structures can be taught explicitly, but these can be reinforced through board games, summarizing, and retelling to develop fluency by using the structures explained. In contrast, they have different strategies to create a non-threatening environment in the class. One uses competition, games, and self-acceptance of mistakes, while the other provides more time to finish the work, deals with

Table. 4
Techniques Recommended by Teachers of the Listening/Speaking/Reading Class

Principle	P81 L/S/R	P80 L/S/R
1	-the hot seat	-standing up in two rows (students facing each other) to retell a story
2	-group work discussions, debates -videos about current topics; examples from TV series, movies, and music	-working in pairs or groups of three
3		-familiar actors and musicians to catch their attention
4	-mid maps to summarize data	-disentangling a reading into an outline to show the structure of a paragraph or essay
5	-motivational videos, quotes	-discussing a familiar topic
6	N. A	-interacting in groups (to produce output and negotiate meaning)
7	N. A	-listening activity to get main ideas first and then some more details
		-interacting in pairs or in groups for incidental learning in negotiation
8	-grammatical explanations -board games	-explaining phonetic concepts explicitly (e.g., how to stress content words in a sentence to produce rhythm, or how to pronounce the final -ed morpheme in regular verbs in past tense). -summarizing the plot of a reading and retell it to three or four different classmates in a shorter amount of time each time
9	-pronunciation rules for -s endings -vocabulary activities and games such as bingo -reviewing vocabulary	-presenting vocabulary through different pictures -input in class (listening comprehension, explanations, vocabulary in readings, pictures) -implicit error correction techniques
10	-relating new topics to students' real-life situations -vocabulary competitions, listening and reading comprehension -games during the class, telling an anecdote -making students feel comfortable about their performance	-a discussion before working on a listening/reading text -using the L2 most of the time in class -extra-time
11	-seeing mistakes as common and part of the learning process -videos, pictures, cartoons, songs, asking students to work alone, asking students to work in pairs or in groups, mind maps or diagrams	-not correcting students on the spot, instead discussing the problems in general with the whole class
12		-presenting vocabulary visually and giving learners an explanation orally

Note. This table shows effective activities that match every principle of the BBL Approach for the Listening, Speaking, and Reading class. The information is taken from instrument three, Part II of the teacher's questionnaire.

error correction, and uses the target language to create a challenging but supportive environment.

In order to motivate students, one teacher discusses a topic that students know well, but the other instructor prefers to use motivational videos and quotes. Thus, two classes that have the same content may have a different environment depending on the strategies preferred by the teacher in charge of the group. Teachers based their methodologies on what they find more effective; however, every group of students has different needs that require some effort on the part of the instructor to discover and fulfill them.

Moreover, the interview for teachers revealed that some of these four teachers have similar beliefs about the BBL principles. For example, two teachers used the same strategies to motivate students by using videos and phrases. In instrument four, they exposed what strategies they employ to activate students' brain in their classes since they are considered relevant for

learning. P81 L/S/R expressed that she uses group work, pair work, discussions, videos, competitions, oral presentations, drawings, and role-plays. However, she prefers not to implement role-plays very often because some students do not like them. The techniques least used by this teacher are posters, class-arrangement, and lists of vocabulary. P80 L/S/R stated that he would use group work, pair work, discussions, videos, oral presentations, drawings, and lists of vocabulary; but he does not use role-plays, competitions, posters, and class-arrangement techniques. Thirdly, P81 G/W specified that he uses group work, pair work, informal discussion among students and teacher, competitions, songs, teacher presentations, but not student presentations, drawings, and lists of vocabulary. Additionally, he does not give importance to role-plays, videos, posters, or class-arrangement. Finally, P80 G/W affirmed to use all the strategies mentioned by the former teachers since she believes in the significance of each of them for learning and putting them into practice.

Instrument two was to analyze the implementation of the Brain-Based Learning principles from the student's perspective. Thus, they were given a set of activities that are part of the BBL principles and asked which ones they considered allowed them to learn more and why. Students said that for the Grammar/Writing class, the activities that helped them to learn more were songs, group work, pair work, and discussions because they can practice more and be in contact with different people. On the other hand, they mentioned that posters, sitting in a semicircle, and videos are techniques that do not allow them to learn since they are not implemented in class. Focusing on the Listening/Speaking/Reading class, students claimed that pair work, group work, role-plays, videos, and teacher oral presentations are useful activities that allow them to learn new vocabulary, practice speaking with others, and improve their hearing (see Figure 8). Most of the students also agreed with the idea that drawings, sitting in a semicircle, and posters are

techniques that do not help them in their learning because they did not have access to them in class; thus, they cannot take advantage of those practices. The questionnaire for students also showed the techniques that teachers implemented and were useful for students, according to students' point of view. Instrument number two classified group work, pair work, discussions, and oral presentations by the teacher as techniques that contributed to their learning in the Grammar/Writing class as well as in the Listening/Speaking/Reading class. Also, there was a strong agreement by students when they said that videos, drawings, sitting in a semicircle, and

Implementation of Activities that are Part of the BBL Principles

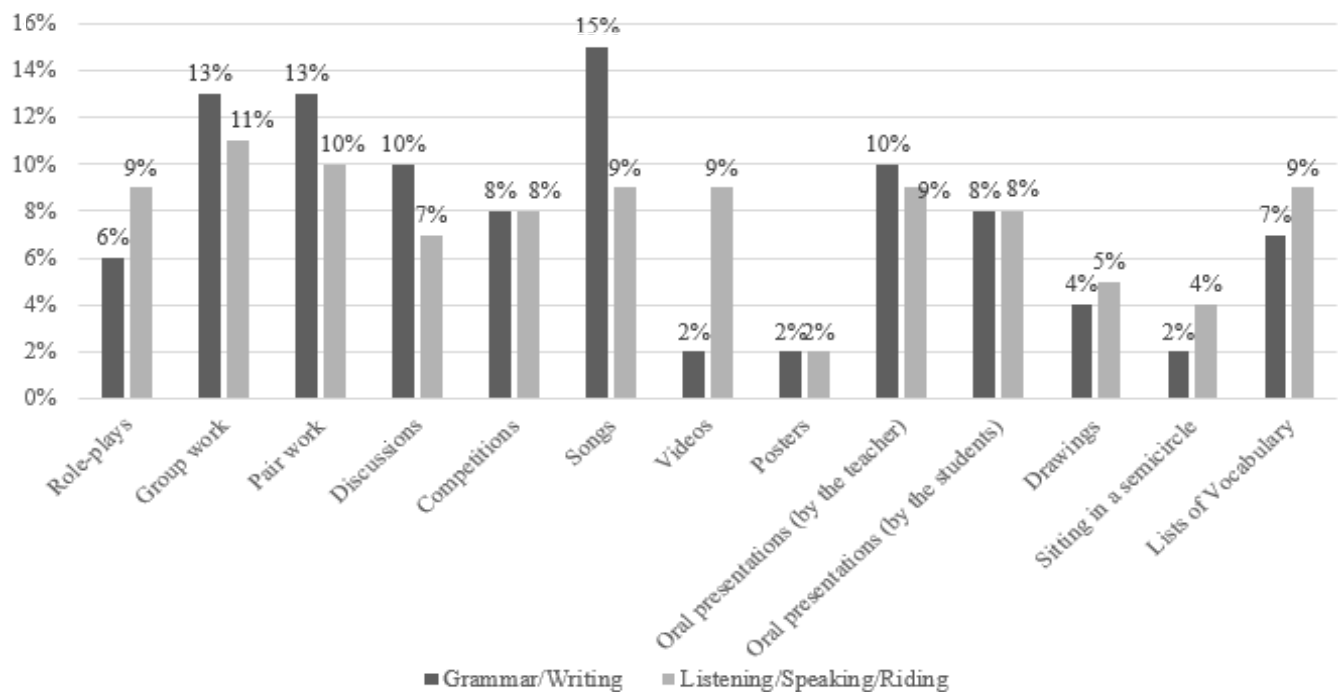


Figure 8. Implementation of Activities that are Part of the BBL Principles. This graph shows the implementation of activities that belong to the BBL Principles. This information is taken from Instrument Two: Questionnaire for Students.

posters were almost never implemented in class. The instructors also mentioned in the interviews that the techniques that were categorized by students with a low score in the level of implementation were not frequently included by them in their teaching. Actually, one of the

results from the interview directed to teachers was that they tend to implement techniques that work for them according to their own learning styles. However, the techniques that were least implemented might contribute to developing aspects such as acquisition of vocabulary, contextualization of topics, exchange of opinions, and inclusion of different learning styles complementarily in class.

Chapter four presented the data analysis and the findings derived from the triangulation of the sources of information regarding BBL implementation. The information analyzed included the principles of the Brain-Based Learning Approach implemented by the professors of the course. These principles were introduced and specified through the different instruments, which allowed researchers to categorize the implementation of principles, their frequency, and activities that were used in class. Also, the impressions that the professors of the course English Integrated Skills I had about the twelve Brain-Based Learning principles were examined. Additionally, understanding the principles and their implementation (and not implementation) in this course will lead to the design of an action plan that promotes BBL in the course English Integrated Skills I. The activities and techniques that according to the research instruments were least implemented in class will be reinforced in the action plan that will be presented in Chapter Five as part of the recommendations of this work. The action plan will empower learners during this first intense exposure to the foreign language. Finally, students' learning will be maximized through effective teaching techniques that intertwine brain, body, and spirit, as consequence of Brain-Based Learning.

Chapter Five: Conclusions and Recommendations

Conclusions

This chapter includes the conclusions and recommendations for teachers who may use the results of this investigation as a resource when planning and developing the English Integrated Skills I program. The purpose of this qualitative study was to investigate Brain Based Learning (BBL) techniques implemented when teaching this course to beginning learners of English. Participants in the study included regular teachers from Universidad Nacional, Costa Rica and full-time students from the English Teaching major who were having their first contact with an intensive program of English. This exploration was guided by three research questions on teachers' perceptions and practices in teaching and students' opinions about the course English Integrated Skills I. The research was conducted using data collected through interviews, questionnaires, and observations. The following conclusions were derived from the fundamentals of this study.

Principles of the Brain-Based Learning Approach Implemented by the Professors

Results for the central research question indicated that Principle 12, *every brain is uniquely organized*, was the most implemented during the course in the Grammar/Writing class as well as in the Listening/Speaking/Reading class. According to the observations, the individual differences in the language skills and sub-skills were addressed since there were several activities in class that allowed students to learn in diverse ways. The results showed that the least developed principles in the course were Principle 1, *all learning engages the physiology*; Principle 6, *the brain/mind processes parts and wholes simultaneously*; and Principle 7, *learning involves both focused attention and peripheral perception*. The investigation also revealed through the students' experience that Principle 10, *learning is developmental*, was frequently

used in class to facilitate the learning process. This shows that prior knowledge as well as keeping track of students' progress were essential aspects considered to monitor students' learning stages.

The results indicated that half of students agreed that Principle 3, *the search for meaning is innate*, was reflected throughout the discussion of engaging topics, which were vital for their future career as instructors. Fortunately, the course English Integrated Skills I made success possible for most learners when being challenged in a relaxing environment (first aspect from Principle 11). The way that students feel influences their enthusiasm and performance towards learning. Additionally, the study revealed that the minority of students usually felt stressed and anxious in class, which hinders communication in the target language. Teachers tried to avoid anxiety in class, but they did not achieve the same effect on all students. All the teachers were unaware of the BBL approach, but at some point, they implemented most of the BBL principles. They said that they did not remember having applied six principles out of twelve, which were Principles 3, 4, 5, 6, 7, and 10. Therefore, these principles should be reinforced throughout the course.

Impressions that the Professors Have Regarding the Twelve Brain-Based Learning

Principles

Results for research question two indicated that there was no awareness of the use of the BBL approach in the classroom. Teachers did not have knowledge of the BBL principles and their implementation, nor the brain and its functions. However, teachers referred to the principles as significant during the process of learning. The teachers' perspective pointed at motivation as the core for learning. Motivation, which is part of Principle 5, boosts positive thinking and lowers the affective filter. Teachers indicated that challenge influences students' learning

positively and allows them to take risks. By being motivated, students develop autonomy and passion, which speed learning. Teachers preferred techniques that involve activities, rewards, complimenting with good scores, and teacher's passion for the subject. Also, teachers did not categorize Principle 12, the one about multiple intelligences, as the most important, although this principle was the most implemented during the time observed. A factor that influenced teachers' preferences regarding Principle 12 was the implementation of styles that favored them as learners. In that way teachers sought to internalize knowledge in students' minds.

Teachers concluded that activities that include movement and physical activity, Principle 1, were one of the most significant aspects for activating learning, but this principle was one of the least implemented during the course. Experts claim that the human brain is stimulated when the body is in action; in other words, "exercise boosts brain power" (Medina, 2008, p. 9). Thus, physical activity increases the ability to focus on a task. Furthermore, the study showed that teachers' age, level of education, and experience influenced the importance given to the different principles. Their attitudes, practices, and beliefs varied. As a matter of fact, experienced teachers tended to use physical movement less frequently than younger teachers. Instructors remarked that teaching the content of the book was a priority, and that time was limited, which did not allow them to take time for games and active pauses (short breaks that relax the body and mind).

Suggested Strategies to Activate Students' Brain During the Course English Integrated Skills I

The results of the previous analysis provided some techniques to activate the brain. Half of the professors agreed on the fact that posters are useful to teach explicitly and implicitly; however, they did not bring any to the class since they share the classroom with other groups of other majors. Another principle that was not frequently implemented is motivation; the use of

quotes, videos, prizes, and positive reinforcement on tests were effective for the collaborating teachers when attempting to encourage students to improve their language skills. Socialization is also convenient when motivating people, finding acceptance, and enhancing different forms of expression. Results showed that most of the teachers preferred to use role-plays occasionally since some students showed discomfort when acting in front of their classmates. Instructors alternated speaking activities during the course while implementing socialization. To do so, the instructors included group work, pair work, oral presentations, and discussions. In the same way, the students observed also agreed that the activities that helped them the most during this course were songs, group work, pair work, and discussions. Finally, half of the teachers observed coincided that explicit grammar and phonology explanation can be reinforced through activities such as board games and summarizing. All these activities allow students to internalize the structures learned in class in order to use them naturally in communication.

Recommendations

By analyzing the findings, the conclusions drawn from this study indicate a relation between the teachers' impressions about the twelve Brain-Based Learning principles and their implementation in teaching the course English Integrated Skills I. However, at the beginning of the survey, none of the teachers showed understanding of the BBL approach since they claimed not to have heard of it. Throughout the observations and administration of the different instruments, it was noticed that the teachers implemented some of the principles without realizing it. Additionally, some teachers claimed to understand how the brain works. Other teachers indicated that they would be willing to learn more about the BBL principles in order to improve their teaching practices since they work with brains every day.

Principles of the Brain-Based Learning Approach Implemented by the Professors

Based on the results of the first research question of this study, the following recommendations for practice were given. One recommendation is that learners should continue to be provided with choices that attract their individual interests by considering the multiple intelligences. Also, teachers could conduct a survey that includes students' preferences according to their age and learning ability. Instruction needs to facilitate optimal brain functioning. Secondly, Principle 1 should be more implemented in class through activities that allow students to be more dynamic and move their bodies. Principle 6 could be reinforced with authentic experiences for students to understand wholes and parts simultaneously. Similarly, the unconscious signals influence the brain and show the importance of the subject being taught. Therefore, by using aspects of the environment such as music, teachers' enthusiasm and modeling, language portable posters, and activities that involve visual stimuli, Principle 7 would be incorporated. Last, teachers should continue to facilitate learning by digging into prior knowledge and keeping track of students' progress as a way to follow the developmental stages of learning (Principle 10).

Principle 3 refers to meaningful learning being channeled through familiar situations since half of the students did not find meaning in the subject studied. Lessons should have lifelike scenarios and meaningful learning to promote curiosity, novelty, and discovery. Another factor that should continue to be part of the lesson is challenge. Challenge and motivation go together; thus, teachers should motivate learners first with an enriching environment to encourage students to do their best. Similarly, teachers should try to create a safe place for students to think and risk. The teacher should be open-minded and humble to create rapport.

Especially in a communicative language class, students need to feel confident to make mistakes. Either obtaining low or high grades must not be the core of the course, but learning for life. Thus, teachers should pay more attention to meaningful learning, problem solving and critical thinking, motivation, genuine experiences, the learning environment, and language development. Using these strategies entails teachers' observation of the most significant needs to be met.

Impressions that the Professors Have Regarding the Twelve Brain-Based Learning

Principles

Based on the results of the research questions of this study, the following recommendations for practice were given. First, workshops could be offered to teachers to help them become aware of the twelve BBL principles and encourage some strategies that they can implement in their daily lessons. These principles apply to all disciplines since they deal with the brain and their most correct functioning. Secondly, motivation for learning should be provided in every class. Motivation should take place by showing students the importance of the subject studied as well as self-encouragement to reinforce intrinsic and extrinsic motivation. Students should be motivated first by the instructor's passion for teaching as well as with videos, quotes, rewards, and games at the beginning of the session, preferably with some form of movement. Thirdly, teachers should continue to use a variety of strategies and techniques to engage students' brains. To achieve this goal, teachers can provide multiple styles tests to students at the beginning of the course to be more effective when addressing the different types of learners.

Teachers should provide active pauses that allow students to release stress and relax. These pauses could be accompanied by activities that require practicing the subject and moving around the classroom or the campus. Thus, Principle 1, *all learning engages the physiology*, should be

more reinforced now that the physiological functioning is directly connected to the capacity to learn. Teachers should be provided with spaces to share effective techniques that activate students' brain to be implemented during the class. During the meetings, experienced and young teachers could figure out how to teach the content of the book and at the same time include activities that complement it with action. Teachers could assign homework and provide answers through the virtual classroom for students to check their progress at home. In the end, the communicative purpose could be fulfilled more effectively within a deadline.

Suggested Strategies to Activate Students' Brain During the Course English Integrated Skills I

It is recommended to reinforce the twelve principles by using techniques that have an impact on students' brain. To reinforce visual stimuli and peripheral learning, teachers can use not only posters stuck on the walls, but portable posters, images projected on the board, music, and a good attitude. These factors have an influence on students since the brain perceives what is around even if it is not explicitly explained. Additionally, teachers should continue to trigger motivation by bringing and asking students to bring quotes, videos, and prizes. To promote social interaction and learning, teachers can consider students' interests by using different activities other than role plays, for example, songs, group work, pair work, and discussions, since most of them were preferred by the students of the course. Finally, explicit grammatical and phonetic explanations should be combined with activities such as playing board games and summarizing to understand the topic in different ways and to raise students' interest in the topics.

The twelve principles are not separate parts, but all of them are intertwined as a unit that helps activate the brain and enhance learning. Some other proposed in-class strategies are recommended to expand the inclusion of the principles. To include physiology in learning,

teachers can include hot potato, Virginia's reel, the hot seat, storytelling (standing up in two rows), among other activities. To promote social interaction, the instructor may include pair work, group work, role-plays, debates, round tables, and discussions. To enhance meaningful learning, role-plays, crossword puzzles, prizes, songs of their favorite singers, videos about current topics, inclusion of TV series, and movies are useful. To create patterning, it is helpful to use diagrams, mind-maps, short readings, summaries, and outlines from readings. To increase motivation, educators and students can bring prizes, positive reinforcement on quizzes and exams, motivational phrases and videos, and discussions about familiar topics. To process wholes and parts simultaneously it is fundamental to make use of popcorn reading, oral questions, listening comprehension (getting main ideas and details), and group interaction. Learning is not only enhanced through direct strategies, but also through strategies that reach the subconscious.

It is vital to strengthen the brain by implementing the following strategies. To include focused attention and peripheral perception, flashcards, posters on the walls, vocabulary banks on the board, and pair/group interaction can be incorporated. To integrate conscious and unconscious learning teachers can include quizzes, fill-in-the-blank exercises, contests, group-work/ pair-work activities, warm-ups, grammatical/ phonetic explanations, reviews, board games, and summarizing. To activate the memory students may need vocabulary lists, word diagrams, charts, reading out loud, sentence patterns for rule discovery, phonetic instruction, games, vocabulary presentation through pictures, input (listening comprehension, vocabulary in readings, pictures), implicit error correction techniques and the use of images, colors, and shapes for rules. To address different learning stages, it is necessary to include step-by-step writing,

peer assessment and peer error analysis, brainstorming, vocabulary review, new topics in real-life contexts, and pre-listening/reading discussions.

To enhance learning through challenge and to avoid threat associated with helplessness and/or fatigue, professors can provide contextualized practices, examples, occasional jokes, warm-ups (games, hangman, word searches, and others), competition, collaborative learning, classmates' names recognition, background music, indirect error correction, class-arrangement, vocabulary contests, listening/reading comprehension, anecdotes, confidence construction, mistakes acceptance, predominant use of L2, and extra-time. To encompass brain uniqueness teachers can bring grab the word games, problem-solving, individual/pair/group work activities, picture-talking, gap-filling, minidramas, dialogues, short stories writing, word chains, videos, cartoons, songs, mind maps, diagrams, visual vocabulary, and oral explanations.

Action Plan

After having stated the conclusions and recommendations derived from the data analysis, an action plan was designed in order to propose activities that promote effective learning in the course English Integrated Skills I through the Brain-Based Learning Approach. The purpose of this action plan is to provide teachers with different activities designed under the BBL principles to activate students' brain and thus take more advantage of their capacity to learn. The activities presented in this section are designed and based on the principles adaptable to the contents of the syllabus pertinent to the course. Also, one characteristic of the activities is their flexibility to be adapted to other topics if instructors find them suitable. All the principles will be included in the action plan that will be provided, focusing and strengthening those principles that were least implemented (1, 6, 7), and the one that the teachers considered the most important (5).

Objective: To provide teachers in charge of the course English Integrated Skills I with a set of useful activities grounded on the Brain-Based principles to maximize students' brain activation.

Description: The action plan in this research is proposed as a way to boost students' brain through the use of activities designed under the BBL Approach. The name of this action plan is "Minding Students' Brain" and consists of a set of activities that might help teachers promote Brain-Based Learning both inside and outside the classroom. The BBL activities suggested do not aim at changing the traditional aspects of teaching that each instructor prefers, but improve their teaching through Brain-Based activities that would maximize and make students' learning more effective. Following the course program outlines, there are activities that match each of the skills: listening, speaking, reading, writing, and the sub-skill grammar. The activities designed for this action plan are focused on three aspects: theory, practice, and the pursuit of improvement. The twelve BBL principles postulated by Caine and Cane served as theory that supported the researchers' ideas to stimulate students' brain and provide them with optimal learning. Moreover, during the data collection part, the teachers confirmed, with their answers and practices, that triggering students' mental processes is a need when teaching. Finally, there is one aspect that all instructors have in common, which is the desire to improve the teaching-learning process and make it more effective for their students' benefit.

Benefits. The implementation of the strategies provided in "Minding Students' Brain" might bring the following advantages:

1. Students' brain stimulation
2. Interaction
3. Inclusion of different learning styles

4. Easy adaptation of activities to different topics
5. Motivation
6. Enhancement of creativity
7. Relaxed alertness and students' attention
8. Active processing
9. Immersion in real life-like experiences
10. Connection of language skills
11. Understanding between teacher and students

Implications. In the attempt to develop the BBL principles effectively in class there might be some implications that need to be considered. When implementing “Minding Students’ Brain,” the instructor must handle the following aspects:

1. Material design
2. Space (classrooms are used for different subjects, which complicates their availability to promote peripheral stimuli through posters)
3. In-class time
4. Teacher’s willingness to accept and develop the strategies proposed

Chapter Six: References and Appendices

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Appendices

Appendix A: Non-participant Observations

Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón
 Licentiate’s Degree in Applied Linguistics in English
 Research Instrument
 Researchers: Teresita Rivera Rodriguez & Maria Carranza Céspedes
 Teacher Observed: _____
 Listening/ Speaking: _____ Reading/ Writing: _____
 Date and time of Administration: _____



Instrument: Observation

Objective: This instrument aims at analyzing the teacher’s use of Brain-Based Learning principles in the Associate's Degree in English and in the Bachelor’s Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón.

Instructions: Arrange with the teacher to observe a class and be familiar with the content of the observation. During the observation, notice the teacher’s strategies to activate students’ brain as well as the times implemented. You can use the codes included at the end of the instrument.

PART I. Answer “yes” or “no” to the questions provided about the implementation of the principles listed. Write how, and how many times they are implemented.

	Yes	No	How	# Times
1. Principle #1: All learning engages the physiology. a. Is the body involved in learning?				
2. Principle # 2: The mind is social. a. Does the teacher include social interaction?				
3. Principle #3: The search for meaning is innate. a. Does the teacher involve students’ interests, purposes, and ideas when planning a lesson?				

	Yes	No	How	# Times
b. Do students participate voluntarily?				
c. Does the teacher implement techniques or strategies that make lessons more engaging?				
d. Do teacher and students share their own experiences as a means to make connections between old and new knowledge?				
e. Does the teacher promote situations related to students' interests?				
4. <u>Principle #4: The search for meaning occurs through patterning.</u>				
a. Does the teacher allow students to find the meaning of the concepts found in the foreign language?				
b. Does the teacher provide students with the time and context in order to understand concepts, categories, and metaphors? *				
5. <u>Principle # 5: Emotions are critical to patterning.</u>				
a. Does the teacher transmit a positive attitude?				

b. Do students show an optimistic reaction towards the learning?				
c. Do students reflect willingness to find solutions when being challenged?				
6. <u>Principle #6: The brain processes parts and wholes simultaneously.</u>				
a. Does the teacher include global experiences such as projects, music, simulations, innovative presentations, and stories, etc?				
7. <u>Principle # 7: Learning involves both focused attention and peripheral perception.</u>				
a. Does the teacher combine focused attention and peripheral perception? *				
8. <u>Principle # 8: Learning is both conscious and unconscious</u>				
a. Does the teacher enhance conscious and unconscious learning?				
9. <u>Principle # 9: There are at least two approaches to memory</u>				
a. Does the teacher promote explicit memorization?				
b. Does the teacher promote implicit memorization?				
10. <u>Principle # 10: Learning is developmental.</u>				
a. Does the teacher respect learning stages?				

<p>11. <u>Principle # 11: Complex learning is enhanced by challenge and inhibited by threat associated with helplessness and/or fatigue.</u></p> <p>a. Does the teacher challenge students at the time that keeps a relaxed environment in the classroom?</p>				
<p>b. Does the teacher use techniques that lower stress levels on students (music, time, etc)?</p>				
<p>c. Does the teacher use correction techniques that do not make students feel threatened or overwhelmed?</p>				
<p>12. <u>Principle # 12: Each brain is uniquely organized.</u></p> <p>a. Does the teacher implement techniques that include different learning styles and multiple intelligences?</p>				

Codes:

Role-play	RP	Competition	⚡	Drawing	● ■
Group work	GW	Songs	🎵	Class Arrangement	CA
Pair work	PW	Oral Presentation	OP	Videos	🎬
Drills	✓ ✓ ✓	Posters	□	List of vocabulary	VL

Appendix B: Questionnaire for Students of English Integrated Skills I Course

Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón
 Licentiate's Degree in Applied Linguistics in English
 Research Instrument
 Researchers: Teresita Rivera Rodríguez & María Carranza Céspedes
 Date of Administration: _____



Instrument: Questionnaire for Students

Objective: This instrument seeks to analyze the implementation of the Brain-Based Learning principles from the student's perspective, in the course Integrated English Skills I of the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón.

Instructions: Please, provide answers that describe your experience as a student enrolled in the course Integrated English Skills I.

Personal Information

Gender: F M Age:

Group: _____

Teacher's name: _____

Class Skills:

- Listening/ Speaking/Reading
- Grammar/ Writing

PART I. Indicate the frequency of each of the following statements by taking the indicators provided into account. Circle your choice.

Indicators	
Never= not implemented	Usually= three times a month
Hardly ever = once a month	Always= four or more times a month
Sometimes= twice a month	


BBL Principles	Never	Hardly ever	Sometimes	Usually	Always
1. There are activities that involve moving in the class. (P1)	1	2	3	4	5
2. You have opportunities to work and interact with your classmates in English. (P2)	1	2	3	4	5
3. The class activities take into account you interests, purposes, and ideas. (P3)	1	2	3	4	5
3. New information is separated into categories and presented with patterns, diagrams, mind maps, and outlines. (P4)	1	2	3	4	5

BBL Principles	Never	Hardly ever	Sometimes	Usually	Always
5. As a student, you feel motivated to learn. (P5)	1	2	3	4	5
6. Students are asked to represent real-life situations to practice new structures in class. (P6)	1	2	3	4	5
7. There are attractive visual materials like posters, music, videos, and presentations. (P7)	1	2	3	4	5
8. Rules of grammar and pronunciation are explained explicitly. (P8)	1	2	3	4	5
9. Games are used in class for you to learn. (P8)	1	2	3	4	5
10. You are asked to memorize. (P9)	1	2	3	4	5
11. You are asked to understand and not necessarily to memorize all the content. (P9)	1	2	3	4	5
12. New topics are explained step by step. (P10)	1	2	3	4	5
13. This course makes you improve your English daily (P11)	1	2	3	4	5
14. There is stress in the classroom. You feel anxious. (P11)	1	2	3	4	5
15. There is no stress in the classroom. You feel confident. (P11)	1	2	3	4	5
16. There are activities that allow you to understand the topics in different ways. (P12)	1	2	3	4	5

PART II. Which activities used by the teacher allows you to learn more? Why do these activities help you learn?

Activities	Yes	No	Why
1. Role-plays			
2. Group work			
3. Pair work			
4. Discussions			
5. Competitions			
6. Songs			
7. Videos			
8. Posters			
9. Oral Presentations (by the teacher)			
10. Oral Presentations (by the students)			
11. Drawings			
12. Sitting in a semicircle			
13. Lists of vocabulary			
14. Other:			

Thank you for your time!



Appendix C: Questionnaire for Teachers of English Integrated Skills I Course

Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón

Licentiate's Degree in Applied Linguistics in English

Research Instrument

Researchers: Teresita Rivera Rodríguez & María Carranza Céspedes

Date of Administration: _____



Instrument: Questionnaire for Teachers

Objective: This instrument seeks to analyze teachers' impressions about the Brain-Based learning principles and their use in the Bachelor's Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón.

Instructions: Please, provide answers that describe your perception of the Brain- Based Approach in TEFL.

PART I.

A. Indicate to what extent you believe that the next statements are important aspects to take into account when teaching. Circle your choice.

	Not important	Somewhat important	Important	Very important	Extremely important
1. The body is involved in learning.	1	2	3	4	5
2. The brain needs social interaction to learn.	1	2	3	4	5
3. It is necessary to consider students' interests, purposes, and ideas when planning a lesson.	1	2	3	4	5
4. New information has to be categorized into patterns (diagrams, mind maps, and outlines).	1	2	3	4	5
5. Motivation is central to learning.	1	2	3	4	5
6. The brain processes detailed and general information simultaneously.	1	2	3	4	5
7. Learners need to pay attention and be exposed to peripheral stimuli to learn effectively.	1	2	3	4	5
8. Learning is conscious (rules need to be explained).	1	2	3	4	5
9. Learning is unconscious (games and activities are used in class).	1	2	3	4	5
10. The content should be memorized explicitly.	1	2	3	4	5
11. The brain memorizes implicitly by understanding the new concepts.	1	2	3	4	5

12. Learning has stages of development. Students' previous knowledge and performance must be taken into account.	1	2	3	4	5
13. Students need to be challenged to enhance learning.	1	2	3	4	5
14. A threatening environment should be avoided.	1	2	3	4	5
15. The classroom should have a stress-free environment to build confident learners.	1	2	3	4	5
16. Each brain is equally organized. There must be a variety of strategies that include the different learning styles	1	2	3	4	5

PART II.

A. Indicate in Column B an activity that you implement in your class in order to match the statements provided in column A.

Column A: Brain-Based Learning Facts**Column B: Activities**

1. The body is involved in learning.	
2. The brain needs social interaction to learn.	
3. It is necessary to consider students' interests, purposes, and ideas when planning a lesson.	
4. New information has to be categorized into patterns (diagrams, mind maps, and outlines).	
5. Motivation is central to learning.	
6. The brain processes detailed and general information simultaneously.	
7. Learners need to pay attention and be exposed to peripheral stimuli to learn effectively.	
8. Learning is conscious (rules need to be explained).	

9. Learning is unconscious (games and activities are used in class).	
10. The content should be memorized explicitly.	
11. The brain memorizes implicitly by understanding the new concepts.	
12. Learning has stages of development. Students' previous knowledge and performance must be taken into account.	
13. Students need to be challenged to enhance learning.	
14. A threatening environment should be avoided.	
15. The classroom should have a stress-free environment to build confident learners.	
16. Each brain is equally organized. There must be a variety of strategies that include the different learning styles	

“Teaching is the art of changing the brain” (Zull, J, 2002, p. 5)

Thank you for your time!

Appendix D: Interview for Teachers of English Integrated Skills I Course

Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón

Licentiate’s Degree in Applied Linguistics in English

Research Instrument

Researchers: Teresita Rivera Rodríguez & María Carranza Céspedes

Interviewee: _____

Date and time of Administration: _____



Instrument: Interview for Teachers

Objective: This instrument seeks to analyze professors’ knowledge of Brain-Based Learning principles and their use in the first year of the Bachelor’s Degree in English Teaching at Universidad Nacional, Costa Rica, Sede Regional Brunca, Pérez Zeledón.

Part I.

A. Instructions: Please, provide answers that describe your experience as an EFL professor. Answer these questions according to your personal and professional opinion.

1. Do you manage sufficient information on how the brain learns?

Yes ()

No ()

2. Have you ever heard of the brain-based learning approach to learning and teaching?

Yes ()

No ()

Brain-Based Learning Principles	Yes	No	How?	Monthly
1. Principle #1: Do you encourage some form of movement in your classroom to help with focus, attention, or learning readiness?				
2. Principle # 2: Do you use grouping techniques to promote interaction? (Pairs, groups, teams)				
3. Principle #3: Do you take into account students’ interests, purposes, and ideas to engage them?				
4. Principle #4: Do you categorized the new information into patterns? (diagrams, mind maps, and outlines)				

<p>5. Principle #5: Do you project a positive attitude to motivate your students?</p>				
<p>6. Principle #6: How do you present the big picture (context) in relation to details?</p>				
<p>7. Principle #7: How do you hook your students' attention on learning? Do you think that peripheral environment is important? Why?</p>				
<p>8. Principle #8: Do you initiate conscious learning? If yes, how? (grammar and pronunciation rules)</p>				
<p>9. Do you allow unconscious learning? If yes, how? (games)</p>				
<p>10. Principle #9: Do you ask your students to memorize? Provide examples.</p>				
<p>11. Do you promote understanding by involving students in real experiences? If yes, how?</p>				
<p>12. Principle # 10: Do you respect learning stages by taking into account students' previous knowledge and performance to present new knowledge in detail?</p>				
<p>13. Principle #11: Do you challenge your students?</p>				
<p>14. Do you do to prevent your students from feeling threatened?</p>				
<p>15. Principle #12: Do you bring activities that allow your students to understand the topics in</p>				

different ways? If yes, which ones?				
16. Do you promote the different learning styles?				

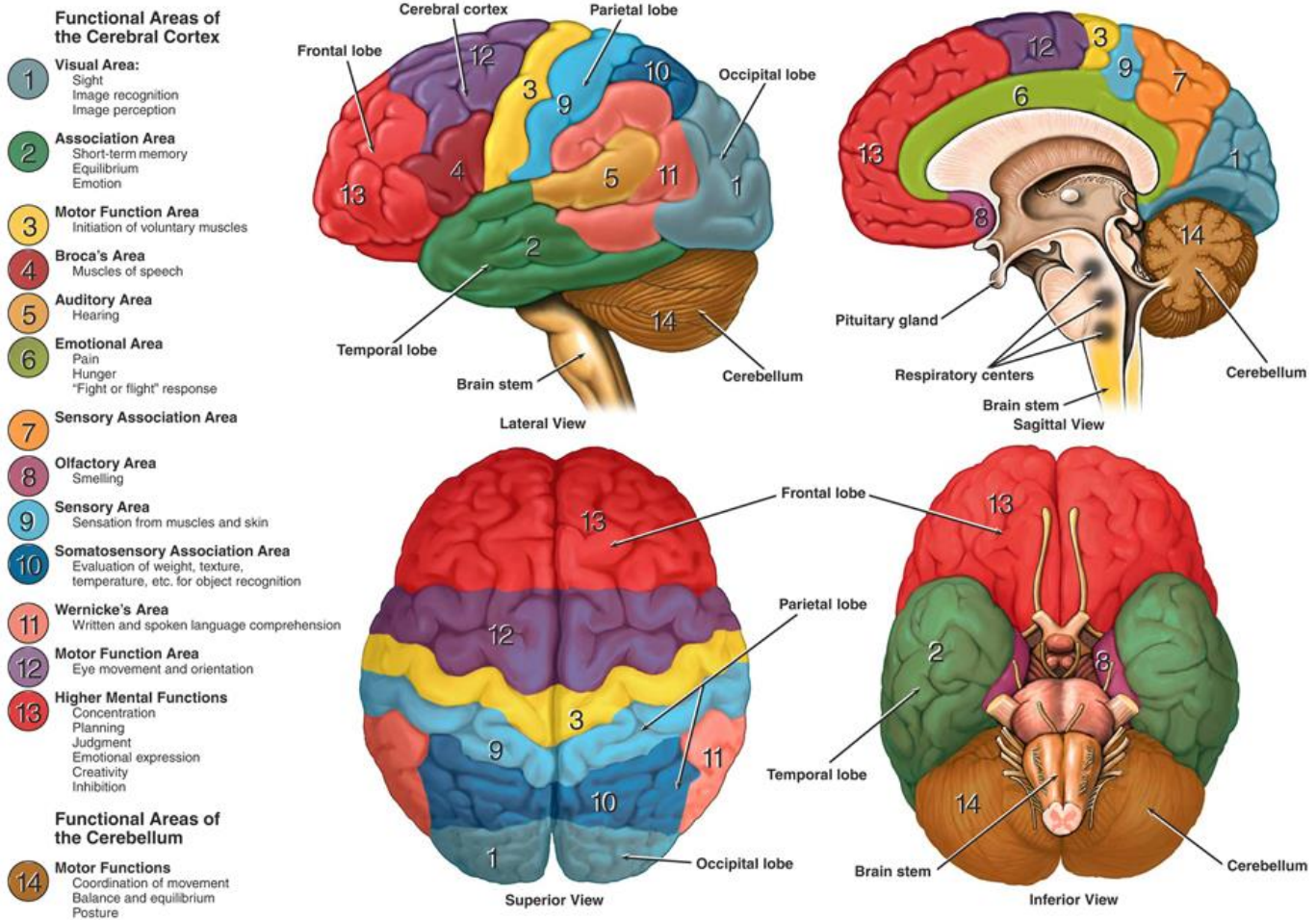
PART II.

A. Do you use activities to activate students’ brain? If yes, which ones? Why do you think that these activities are effective for the Integrated Skills’ class?

Activities	Yes	No	Why
1. Role-play			
2. Group work			
3. Pair work			
4. Discussions			
5. Competitions			
6. Songs			
7. Videos			
8. Posters			
9. Oral presentations (by the teacher)			
10. Oral presentations (by the students)			
11. Drawings			
12. Sitting in a semicircle			
13. Lists of Vocabulary			
14. Other:			

Appendix E: Parts of the Brain and Their Function

Parts of the Brain and Their Function



Appendix E. Parts of the Brain and Their Function. (2017). Retrieved from

<http://headwaycornwall.org.uk/about-brain-injury/>

Appendix F: Teacher's Guide