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RESEARCH REPORT

INNOVATIVE STRATEGY BASED ON NEUROSCIENCE TO TEACH ENGLISH TO ELEMENTARY STUDENTS AT 5 DE AGOSTO SCHOOL, IN ESMERALDAS

INFORME DE INVESTIGACIÓN

ESTRATEGIA INNOVADORA BASADA EN NEUROSCIENCIA PARA ENSEÑAR INGLES A ESTUDIANTES DE BASICA ELEMENTAL EN LA ESCUELA 5 DE AGOSTO, ESMERALDAS

PREVIO AL GRADO ACADÉMICO DE:

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LINE OF INVESTIGATION

INNOVATIVE DIDACTIC STRATEGIES AND METHODOLOGIES

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STATEMENT BY THE AUTHOR

I, Erick Daniel Cueva Santana, affirm that the investigation in the present report research is totally unique, authentic, and personal.

The content of this research is a limited legal and academic responsibility of the author and PUCE Esmeraldas.

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CERTIFICADO DEL DIRECTOR

Yo, Msc. José Suarez Lezcano, en calidad de directora de esta tesis, certifico haber revisado que el trabajo cumple los requisitos de calidad, originalidad y presentación exigibles y que se han incorporado las sugerencias del Tribunal al trabajo de grado.

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DEDICATION

I dedicate this work to my parents, for their unwavering support, love, and sacrifice throughout my academic journey. To my family, for their constant encouragement and understanding. To my friends, for their encouragement and motivation in difficult times. To my dear love Fátima, for being my rock, my inspiration, and my daily motivation. To my teachers and mentors, for their guidance and wisdom imparted. To all those who in any way contributed to this achievement, my sincere thanks. This work is dedicated to you, who have been my source of inspiration and strength.

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ABSTRACT

To design an innovative strategy based on Neuroscience to teach English to elementary students at 5 de Agosto school of Esmeraldas, Ecuador, a mixed approach investigation based on a descriptive scope was carried out with a population of 90 students and with a sample of 45 students from different levels. The methods used were analysis and synthesis, hermeneutics, and descriptive statistics, with the techniques of documentary review, a survey with the questionnaire, and an interview with some questions as the main instrument. The results revealed that the topics that students like the most are "Fruit and Vegetables", "Abilities with can/can't", "Parts of the house". However, the topic they find difficult, and not only at this level, is the "Verb to be. Furthermore, students like to participate in class, they prefer to be the center of the class, they love a communicative class where the English language flows at its best. They show interest in group work, art related work, and consider their emotional state very important. The strategy designed is based on Neuroscience, and some theories related to motivation, interest, and the creation of a good educational environment. It is recommended that teachers receive training based on Neuroscience and psychology so that the teaching-learning process is effective and affective.

Keywords: Students; English learning; Neuroscience; English Teaching; Motivation; Behavior

RESUMEN

Con el fin de diseñar una estrategia innovadora basada en la Neurociencia para enseñar inglés a estudiantes de primaria de la escuela 5 de Agosto de Esmeraldas, Ecuador, se realizó una investigación de enfoque mixto basada en un alcance descriptivo con una población de 90 estudiantes y con una muestra de 45 estudiantes de diferentes niveles. Los métodos utilizados fueron análisis y síntesis, hermenéutica y estadística descriptiva, con las técnicas de revisión documental, encuesta con el cuestionario y entrevista con algunas preguntas como instrumento principal. Los resultados revelaron que los temas que más gustan a los alumnos son "Frutas y Verduras", "Habilidades con puede/no puede", "Partes de la casa". Sin embargo, el tema que les resulta difícil, y no sólo en este nivel, es el "Verbo ser". Además, a los alumnos les gusta participar en clase, prefieren ser el centro de la clase, y aman las clases comunicativa donde la lengua inglesa fluya al máximo. Muestran interés por el trabajo en grupo, por los trabajos relacionados con el arte y consideran muy importante su estado emocional. La estrategia diseñada se basa en la neurociencia, a partir de algunas teorías relacionadas con la motivación, el interés y la creación de un buen ambiente educativo. Se recomienda que los profesores reciban formación basada en la neurociencia y la psicología para que el proceso de enseñanza-aprendizaje sea efectivo y afectivo.

Palabras clave: Estudiantes; Aprendizaje del inglés; Neurociencia; Enseñanza del inglés; Motivación; Comportamiento.

INTRODUCTION

Theme presentation

English is one of the most widely spoken languages in the world, in consequence mastering it offers several job opportunities, international labor doors are opened, and there is deep access to information, among others.

The teaching of English as a foreign language to elementary students has been a constant challenge for teachers and educational systems around the world. Despite the efforts developed, many students fail to acquire the necessary command of the language. Faced with this problem, it is crucial to explore new pedagogical strategies that are based on scientific advances and take advantage of the understanding of cognitive and learning processes provided by Neuroscience.

English teachers must oversee finding the necessary activities, preparing didactic materials, using the appropriate technological resources according to the needs and the different learning styles, and above all, preparing lesson plans with all these aspects.

Over the years Neuroscience has been dedicated to the study of the human brain, to discover how it works, to improve the teaching-learning process. Neuroscience aims to change how new information is learned and which internal or external factors affect the ability to learn. Motivation and attracting students' attention are crucial factors, and teachers must perform certain dynamics, games, and motivation, with Neuroscience, for the teaching process will be more effective.

Therefore, Neuroscience can be applied in education, where teachers can put it into practice, use strategies, and create opportunities to learn the English language. Knowing how the brain works will help us to understand the mechanisms we use to acquire knowledge. It is now known that the emotional state influences the functioning of the brain, as does stress.

It is important to work on experiences because allow to become learning much more meaningful, that is, to work with previous events as examples and use them in class thus students have a clear idea of the topic to be covered. To create associations students with the practice and improvement of the English language will be able to improve their communication and cognitive skills.

Problem Statement

In my pre-professional practices, it was possible to identify that there are some students with problems when learning the English language, there are certain internal or external factors that do not allow the teaching-learning process to be effective, causing deficient performance of the student in the English subject.

Certain factors such as misuse of methodologies and techniques, lack of Neuroscience training for teachers, lack of technological and didactic resources, and disinterest or family conflicts may result in family arguments or inadequate parenting style. Due to these causes or reasons mentioned above, students' performance can be affected, and those problems can be reflected in emotional problems, lack of motivation, fatigue, anxiety, low self-esteem, lack of sleep, malnutrition, and in more serious cases, scholar dropout.

The English language offers many opportunities for the person who speak, for this reason, it is taught in public and private schools in Ecuador, however, those students who are not interested will have few opportunities to meet people, visit countries, and even acquire good jobs. Therefore, Neuroscience will be used to propose a strategy and apply it in the classroom to improve the teaching-learning process of the English language.

These problems are present in the 5 de Agosto school and all public or private institutions in Esmeraldas.

For the reasons mentioned above, the question arises:

What strategy based on Neuroscience may be used to activate the brains of elementary students at 5 de Agosto school in Esmeraldas?

Justification

English language acquisition is slowed down when teachers adopt outdated or ineffective methods because they place the teacher rather than the students at the center of the classroom.

Neuroscience can offer useful insights to enhance instructional strategies and promote more effective learning. As new information is learned, the brain's shape and function may change, as demonstrated by neuroscientific research. This implies that pupils' brain chemistry and structure might be affected by their English learning. Teachers

may develop techniques which more effectively use the brain's capacity to learn and remember English by knowing this brain plasticity.

Teachers require techniques to encourage students because certain students struggle with motivation and because diverse learning styles impede the teaching-learning process. Students can easily comprehend how to acquire the English language because Neuroscience is a scientific field that investigates everything linked to the brain. Using tactics or approaches where the student is the center of the class, rather than the instructor, can help students improve their imagination, creativity, problem-solving, and language abilities. This contrasts with typical classrooms where the teacher is the center of the class, directing, modeling, etc.

The idea is to develop an innovative approach using Neuroscience to bring out the best in pupils and ensure a fruitful educational experience.

The purpose of this thesis is to encourage students to step outside of their comfort zone, apply their abilities, engage in engaging activities, and, most importantly, use their minds to learn a new language. The importance of adopting innovative methods based on Neuroscience and the necessity to solve the current challenges in teaching English to primary school pupils serve as the foundation for this thesis.

Objectives

General objective:

To propose an innovative strategy based on Neurosciences to teach English to elementary students at 5 de Agosto school, in Esmeraldas.

Specific objectives:

1) To determine the contents to be taught using Neurosciences in the real context of English Language Teaching to elementary students.
2) To identify the type of activities that students would like to use in the English class to activate learning.
3) To design an innovative strategy based on Neurosciences to improve the English language process in elementary students.

CHAPTER I

THEORETICAL FRAMEWORK

1.1 Scientific Theoretical Foundation

1.1.1 Neuroscience

Understanding how the nervous system works to produce feelings, emotions, thoughts, behaviors, and easy bodily functions is the goal of Neuroscience. According to Oktar (2006) "Neuroscience links our observations about cognitive behavior with the actual physical processes that underpin that behavior" (p. 155). Neuroscience and education interact with each other to discover the necessary conditions that the brain needs to learn or how Neuroscience indirectly influences education.

In order to learn, the brain needs to be influenced or stimulated by several factors, such as reward, motivation, decision making, good physical health leads to good mental health, and other factors. "Educational Neuroscience is the discipline that combines Neuroscience, pedagogy, and psychology" (Sousa, 2010, p. 1). These three important aspects that make up Neuroscience allow us to study the way the brain learns, how each task influences, class activity, how students develop themselves working in groups, and discover what the brain needs for the teaching-learning process to be effective.

Neuroscience studies how the brain learns and how the teaching-learning process might be improved. This field studies the interplay of neurons, the substances that impact them, and complicated mental processes. It identifies the brain's capacity to classify information, which explains why people learn differently. Nerve cells interact to form behavior, which is impacted by both environment and experience. Brain plasticity enables the brain to change itself during learning, emphasizing the significance of ongoing education (De la Barrera & Donolo, 2009). Cognitive growth and executive abilities, such as metacognition, are linked to how the brain's prefrontal regions work. Educational Neuroscience can enhance education quality by studying how the brain processes information and designing more effective teaching and learning strategies.

1.1.2 The nervous system

The nervous system is a complicated network of cells that interact using electrical impulses and neurotransmitters. The interaction of these cells at synapses is required for

the organism to operate properly (Alcaraz, 2000). The neurological system determines who we are. Our personality, attitude, intellect, and coordination are all nervous system reactions that are always at work. The brain is a crucial component of the neurological system.

1.1.2.1 The Brain and the hemispheres

The brain is recognized as the governing organ of the human body; it allows for movement and meaningful learning through perception; it is constantly learning, obtaining information from the environment in which it develops and storing it in short- and long-term memories, depending on its relevance (Moreira et al., 2021).

The right hemisphere oversees the development of the capacity for spatial reasoning, visualization, and creativity; it is distinguished by visual information processing as well as musical and rhythmic processing, making it associated with the development of artistic and spatial abilities. On the other hand, the left hemisphere is associated with a sequential and temporal way of thinking; it acts "step by step," that is, by sequencing the input one after the other. It is associated with language, linguistic aptitude, logical and numerical reasoning, and analytical thinking. This hemisphere thinks methodically and sequentially, relying on logic over intuition and feelings (Muñoz et al., 2012).

One hemisphere is not more significant than the other: to complete any activity, we must engage both hemispheres, especially if the task is complex. We need to engage both hemispheres, especially if the work is complex. To learn effectively, both hemispheres must be used. However, many people prefer to use one hemisphere over the other or think in a specific way. Each manner of thinking correlates with unique skills.

1.1.2.2 Neurons

Neurons are the essential components of the brain and nervous system in general. When neurons group together, they build complex neural networks that enable learning and cognition. These specialized cells are structurally and functionally important, designed to receive, process, and transmit information via electrical impulses, as well as to influence other neurons. As a result, the nervous system's function is supported by dynamic interactions between these cells, allowing for a variety of cognitive and behavioral processes (Haines, 2013).

When students are engaged in learning, they start the process of making connections between neurons. These connections begin to form regardless of whether children are in a classroom, studying at home, learning a new athletic ability, or exploring a new computer game. Essentially, they cause their axons (neural extensions) to lengthen and almost contact dendritic spines. When a learning neuron gets close enough to another neuron, a signal travels across the thin space between the two neurons, known as a synapse. This signal, as it travels from neuron to neuron, creates our ideas and serves as the foundation for our learning (Oakley et al., 2021).

1.1.3 The reticular activating system (RAS)

The reticular activating system (RAS) is the brain's first filter for sensory information, and it is especially sensitive to innovation and change, which are connected with pleasure and curiosity. Understanding how the RAS operates is critical in education for maintaining students' attention and interest. Strategies such as adjusting voice modulation, employing color-coded important points, changing seating configurations, and providing novelty through posters or music might help to prime the RAS for focused learning. Increasing interest via predictions and unusual experiences, such as placing radishes on tables, activates the RAS and promotes attentive concentration on lesson content. Pleasurable learning experiences improve knowledge retention and long-term memory development (Willis, 2010).

Instilling novelty and interest in educational activities can improve learning outcomes by maximizing sensory input via the RAS. Incorporating a variety of stimuli, stimulating curiosity, and encouraging positive learning experiences can activate the RAS and allow effective information processing, resulting in better learning outcomes and long-term memory consolidation.

1.1.4 Brain-based learning

Brain-based learning is a comprehensive teaching approach to understanding the brain, and how it learns, and explaining learning behaviors using techniques related to emotions, feelings, and individual experiences. "Brain-based learning is ESP, E active ENGAGEMENT, S purposeful STRATEGIES, P based on PRINCIPLES derived from Neuroscience" (Jensen, 2008, P. 4).

Likewise, Jensen mentions that there are some principles based on the brain, among the most important are:

- The brain seeks and generates compensation: Humans, whether purposefully or unintentionally, bring meaning and worth to ordinary events. The more the significance of the meaning, the greater the care and attention dedicated to changing its substance.

-Our perception shapes our experience: People are very readily affected, to the point that it may even change the way we think. When a person changes his perception of the world, he transforms his experience. Change in the brain is driven by experience.

-Intentional constraints: Most people can't focus for lengthy periods on things they don't enjoy or that quickly entertain them. Similarly, each student learns uniquely, and some professors do not come to engage the student. Tailoring material to the learner improves concentration and motivation to study.

1.1.5 The teaching-learning process

The primary goal of the teaching-learning process is to contribute to the whole development of the learner's personality, which includes acquiring information, behavior patterns, values, and learning techniques. During this process, the student must absorb the rules, concepts, and theories of each topic while interacting with the teacher and classmates, establishing learning processes and methods based on social principles and values, and adopting enriching lifestyles (Campos & Moya, 2011). Pedagogical strategies, learning environment, student engagement, and adaptability to diverse learning styles all have an impact on the effectiveness of the teaching and learning process.

The brain has two basic mechanisms for storing new knowledge in long-term memory. The declarative approach is frequently connected with events or actions, whereas the procedural path entails memorizing intricate patterns.

Providing opportunities for both declarative and procedural learning is essential. One-minute summaries, in which students write down what they remember immediately after a session, and peer teaching, in which students collaborate to teach one other facts and information from a lesson, are good approaches for students to connect declarative knowledge to long-term memory. Alternatively, teaching using procedural routes necessitates the capacity to practice, and the real practice of a skill aids in the automation of knowledge. Incorporating classroom activities that use both types of routes will improve learning outcomes for all students (Collins, 2018).

1.1.6 Motivation

Motivation is a reason why you want to perform some action and determines the behavior of an individual or group. Each person has different motivations, depending on the tastes of the people and the effort for which an action will be carried out.

- Intrinsic motivation: It is the one that motivates us to do something when we want to do it.
- Extrinsic motivation: When we do an activity or action motivated by external rewards or punishments.

1.1.7 Environment and Behavior

Environmental psychology can help educators understand how the physical and social environment affects kids' behavior and learning. This subject provides useful information for developing more effective learning spaces and encouraging a setting that promotes students' cognitive, emotional, and social development by considering the interaction between individuals and their educational environment. Furthermore, by understanding that individual conduct may influence the educational environment, environmental psychology emphasizes the necessity of instilling environmental responsibility and dedication in the educational community (Roth, 2000).

Integrating environmental psychology ideas and discoveries into educational space planning and design can help to dramatically improve students' learning experiences and well-being. To improve educational planning from the approach of environmental psychology, it is critical to conduct an extensive evaluation of the educational environment, design welcoming and stimulating learning spaces, incorporate natural elements, foster social interaction, consider student diversity, train teaching staff, and conduct periodic evaluations to adjust planning based on needs and outcomes. These parameters help to create educational settings that encourage effective learning and the overall development of pupils.

1.1.8 The Zone of Proximal Development

The zone of proximal development according to Vygotsky refers to the number of skills that can be used when performing an activity. According to Vygotsky, the ZPD is the distance between the level of actual development determined by independent problem-solving and the level of potential development determined by solving problems under the guidance of adults or in collaboration with more capable others.

The Zone of Proximal Development can be interpreted as a system where the subject that learns, a semantic instrument that is learned, and the subject that teaches are identified as constituent elements.

1.1.9 The Socio-Cultural Approach to Language Teaching

Vygotsky's sociocultural theory refers to the participation of an individual in the surrounding environment, including culture, religion, belief, and others. Vygotsky (Russia, 1896-1934) argued that children gradually develop their learning through social interaction: they acquire new and better cognitive abilities as a logical process of their immersion in a routine and familiar way of life. Vygotsky puts more emphasis on culture and how it affects cognitive development.

1.1.10 Cognitive Processes in Language Acquisition

Language learning is a complicated cognitive process involving several cognitive processes. Understanding these cognitive processes is essential for developing successful language teaching techniques. The cognitive processes involved in language learning and their consequences for language education are investigated in this scientific theoretical framework.

Attention is essential in language learning because it allows learners to focus on pertinent linguistic information. Attentional processes, according to research (Smith & Gasser, 2005), aid in the recognition and processing of language information. Interactive activities, visual aids, and relevant context should be used in language training to grab and sustain learners' attention.

Learners' knowledge and monitoring of their own thinking and learning practices are involved in metacognitive processes. Self-reflection, self-regulation, and strategic language acquisition are all aided by metacognitive skills. Vandergrift & Goh in 2012 argued that language instruction should teach metacognitive processes such as goal formulation, self-assessment, and method evaluation to help learners become independent and reflective language learners.

Understanding the cognitive processes that occur during language learning is essential for developing successful language teaching techniques. Attention, memory, perception, executive processes, and metacognition all play key roles in language learning. Educators can improve the learning experience and improve language skills among students by incorporating these cognitive processes into language training.

1.1.11 Assessment and Feedback in Brain-Based Language Instruction

Assessment and feedback are critical components of brain-based language training because they improve language learning outcomes. The importance of evaluation and feedback in the context of brain-based language training gives insights into effective tactics and their effects on language competency among learners.

The cognitive processes involved in language acquisition should be aligned with brain-based language evaluation. Formative evaluations that encourage frequent practice, spaced repetition, and interleaving should be used to aid memory consolidation and recollection (Roediger & Karpicke, 2006). These exams can help to improve long-term retention of language skills while also encouraging neuroplasticity.

Frequent and constructive feedback is beneficial to brain-based language education (Hattie & Timperley, 2007). Immediate feedback activates the reward regions of the brain, fostering pleasant emotional states and increasing motivation and attention during the learning process. Feedback should be customized to the learners' present level of language skill, with progressive increases in challenge (Vygotsky, 1978). Scaffolding feedback promotes cognitive growth and language skill improvement while making learners feel supported.

Encouragement of self-assessment and metacognition increases learners' knowledge of language learning techniques and progress (Boud & Falchikov, 1989). This reflective technique promotes self-regulated learning and encourages students to take charge of their language development.

1.2 Antecedents

Gunawan in 2019 conducted research at Indonesia Christian University-Jakarta, focusing on first and second-semester students because most of the students since they were in elementary school do not remember the use of the verb ‘to be’ and other grammatical tenses. The main objective of this research is to find a way to apply Neuroscience to improve strategies focused on the theory and practice of the English language in these learners. It has a qualitative approach since an interview was conducted with the students.

It emerges that teachers using Neuroscience in English language teaching show students have significant improvement, becoming active and comfortable learners mainly in English language grammar. In addition, he recommends teachers create their strategies

according to the student's needs and thus improve their communication skills in academics and daily life.

The senses are the gateways to knowledge acquisition and using as many sensory senses as possible enriches students' knowledge. Due the fact the multisensory approach comes in, as it focuses on presenting teaching points to students through three sensory modalities: visual, auditory, and tactile. They encourage using technology such as computers, audio, video, radio, and telephones to help in the procedure. Leaving aside traditional methodologies that emphasize knowledge or language above conversational abilities.

In 2019, Lan carried out a research entitled "The Significance of Neuroscience for Teaching English as a Second Language (TESL) in the Digital Era" at the Chinese Institute of Engineers in Hong Kong, applying a 14-question interview after completing 8 lessons of the IELTS preparation course. Aiming to demonstrate how important Neuroscience is in TESL. It is highlighted that instructors must have a comprehensive understanding of psychology and Neuroscience. Understanding the brain and how it works improves English language teaching in ways that go beyond pedagogical techniques and fundamental concepts. Neuroscience, in conjunction with psychology and education, will assist and support ESL instructors in meeting the quickly changing requirements of students at all levels, dealing with complex classroom challenges, and advancing their professional development.

Edjidjimo in 2022 wrote an article entitled "Teaching English to the Rhythm of the Brain", based on a thesis carried out within the master's program in neuroeducation and skills optimization of the Higher Institute of Psychological Studies of Barcelona. To write this article, a bibliographic review was conducted, presenting neurological approaches and strategies. He points out that it is necessary to stimulate the student's brain, to teach at the rhythm of the student's brain, and thus create an adequate environment where students can participate in learning by creating a good, rewarding, and interesting experience, focusing on reducing stress, creating agreements between students and teacher, strengthening working memory, creating a feedback environment if necessary, encouraging interaction among peers, some activities he recommends are games, multisensory activities, mind maps, graphics, videos, songs, body movements,

etc. In such a way to put the students' brains to work, they learn a new language (English) in an attractive, easy, and uncomplicated way.

In Venezuela, Cañas and Chacón in 2015 performed research entitled "Contributions of Neuroscience for the Development of English teaching strategies". This paper presents the contributions of Neuroscience in a documentary, informative, and analytical review of the application of Neuroscience to the teaching and learning of English as a foreign language. They propose that an enriched educational environment should include a variety of sensory experiences, emotional orientation, attention management, and elements such as danger and stress, as well as memory consolidation.

Teachers must be imaginative, adaptable, and active, abandoning established paradigms and acknowledging the importance of emotions in learning for pupils to attain their full potential and obtain essential learning. Similarly, the use of didactic games, information and communication technology, music, objects, and collaborative work is advised to create positive attitudes toward learning and keep students active to ensure the effectiveness of the teaching-learning process.

Benitez in 2016 made research entitled "Neuroscience in the learning of English as a second language in students of the seventh year of Basic Education of the educational institution Colegio EMDI, in the city of Quito, school year 2014-2015" in order to determine Neuroscience as a pedagogical strategy in the teaching of English level A2 as a second language. It was a mixed approach research, in an exploratory way, carried out through data collection, a survey, and observation.

The author suggests making space in the classroom for attention, motivation, and relaxation activities to promote a good attitude toward the activity and the learning process. In addition to collaboration and activities outside of the classroom, establishing a positive attitude in kids, inspiring them, and providing them with the opportunity to try new things. She also emphasized the need for teachers to receive training at least once a year to contribute to kids' growth.

Domínguez in 2018 developed research in the city of Esmeraldas-Ecuador, titled "Multiple Intelligences and their Influence on the Development of the Applied Linguistics School Students Oral Skills at Puce Esmeraldas, 2017" to analyze the predominant intelligence possessed by the students of Applied Linguistics of PUCESE. The empirical

method used was the survey, quantitative approach, and descriptive scope. As a result, most students are afraid of making mistakes when they speak, and the best way to study English is by listening to music and talking to friends in English. It is recommended the use of different methods to improve oral skills such as the direct method, audiolingual method, and communicative language teaching.

CHAPTER II

METHODOLOGICAL FRAMEWORK

2.1 Context

This research was carried out at "5 de Agosto School", in Esmeraldas, Ecuador, in the academic year 2023. This school is in the Propicia neighborhood. The institution has courses from elementary to high school, morning, and evening sessions. Each group has between 25 and 40 students.

2.2 Type of research

The investigation followed a mixed approach, which according to Tegan (2023) covers the issue by combining quantitative and qualitative research methods. Mixed methods can help you acquire a broader understanding than a solitary quantitative or qualitative research since it incorporates the benefits of both disciplines. Qualitative methods were used because the teacher described and interpreted the various innovative strategies that were used to improve students' performance and motivation in learning the English language. However, it is also quantitative; the teacher is responsible for collecting and analyzing data.

The scope was descriptive which is defined as "Descriptive studies seek to specify the properties, characteristics, and profiles of people, groups, communities, processes, objects or any other phenomenon that is submitted for analysis." (Hernandez et al, 2017, p.125). The research will describe the innovative strategy based on Neuroscience to teach the English language.

The design of this research was non-experimental.

2.3 Population and Sample

The population was made up of 90 students in 6th grade of the morning classes of the 5 de Agosto school. The sample was purposive, it consisted of 40 students of all the groups, and these groups are that represents the greatest difficulty in learning; they have bad behavior, low grades, and less participation in classes.

2.4 Variables

2.4.1 Operationalization

The variables studies were:

-Dependent Variable: The English teaching to elementary students.

-Independent Variable: Innovative strategy based on Neuroscience.

2.5 Hypothesis

Implementing a Neuroscience-based teaching strategy for English language instruction in basic students will lead to improved language acquisition, enhanced cognitive abilities, and increased overall academic performance.

2.6 Methods

Inductive-deductive methods were applied, which allowed narrating and explaining the facts of the study, since some investigations were analyzed where some conclusions were drawn on aspects that may affect the motivation of students.

The ethnographic method was also used, since it was socialized with the students, it was possible to observe the strategies used by the teachers and listen to their participation in the classroom.

Analysis and synthesis, analyze the object of study separately (analytically) and then repeat the process in a combined (synthetic) manner. By integrating these parts, we may study them holistically.

Hermeneutics, involves a dialectical process in which the researcher navigates between the parts of a document, thesis, article, and the entire text to get an appropriate understanding of it.

2.7 Techniques and Instruments

The techniques used were survey, interview, and documentary study.

A questionnaire with 5 closed questions. And a chart with 7 aspects using the frequency scale.

A guide of questions to interview with the teacher in charge of the 6th grade of the school 5 de Agosto, which had 7 open-ended questions.

For the documentary study, Google Scholar, Scielo, Redalyc, and Scopus were used as search engines. We searched for original articles where management models were published and for their analysis, we selected prospective and randomized controlled studies that included the keywords Neuroscience, brain-based learning, emotions, technology, and brain.

2.8 Data Processing

As a questionnaire and observation were carried out, the results obtained were processed, compiled, and managed through tables and statistical graphs, using the Excel program, which is used for this type of research work.

CHAPTER III

3.1 RESULTS

To determine the contents that the teacher used with Neuroscience in the English class focused on the real context an interview was carried out.

The interview with the English teacher was designed to elicit information on the impact of Neuroscience on students' learning, knowledge of learning styles, the relationship between emotions and thinking, and the role of Neuroscience in the formation of experiences and motivation.

The interview showed a preference for activities beyond simple repetition in terms of Neuroscience-based activities. The instructor stressed the necessity of including incentive-focused exercises in the curriculum, which is consistent with the belief that motivation is critical in the learning process.

In terms of language abilities, the interview emphasized the importance of speaking and listening skills in the classroom. The teacher acknowledges speaking and listening as the most used skills, emphasizing the importance of language development.

The teacher mentions using several techniques to teach grammar, such as infographics, flashcards, and posters. These materials were thought to be useful in communicating grammatical concepts and making the learning process more enjoyable for students.

The teacher who was questioned also gave insights on difficult grammatical issues, including the verb "to be" in all tenses and the usage of personal pronouns as areas that pupils struggle with.

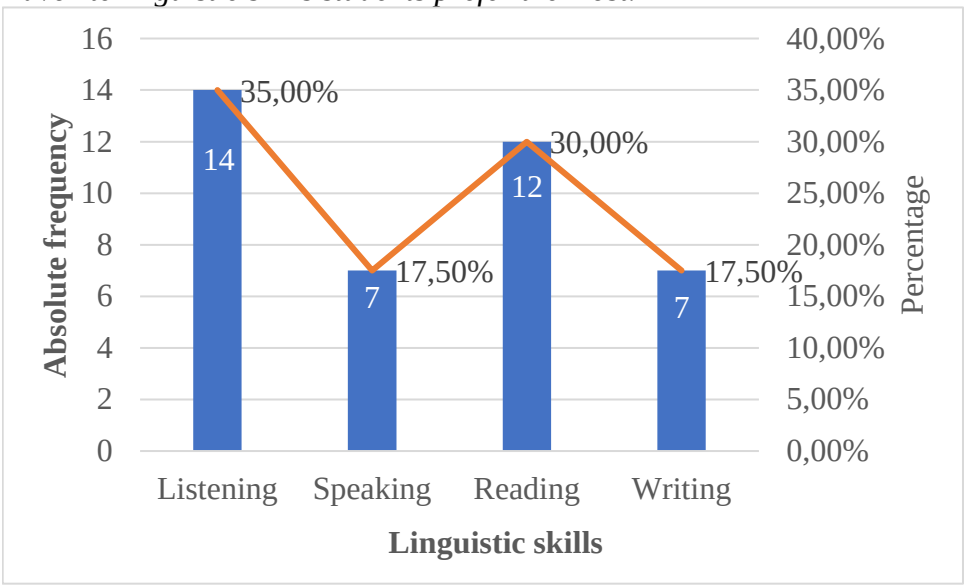
In terms of vocabulary, the teacher pointed out that students are particularly interested in topics related to fruits and vegetables. Additionally, the interview showed the integration of Neuroscience into vocabulary instruction, with specific topics such as the alphabet, feelings and emotions, action verbs, and parts of the house being highlighted.

To fulfill the aim to identify the type of activities that students would like to use in the English class to activate learning, a questionnaire was applied to the students to know what type of activities they felt more motivated to learn.

Concerning the student's favorite linguistic skills, 35% of the students mentioned that listening is their favorite linguistic skill, 30% of the students prefer reading, and there is a similitude between speaking and writing with 17.5% each (Figure 1).

Figure 1

Favorite linguistic skills students prefer the most.



Note: n=40 Source: Survey

Table 1 shows that there is high receptivity to the emotional influence in the educational process 100%; likewise, artistic, and musical activities play a significant role in the educational preferences of students 82.5%, and finally, the preference is for learning through stories with narrative approaches in the teaching of vocabulary 85.00%.

Table 1

Aspects that influence learning

	Factors involved in the students´ preferences					
Items	**Yes**	**%**	**No**	**%**	**Total**	**%**
Emotional influence	40	100	0	0	40	100
Artistic or musical activities	33	82,5	7	17,5	40	100
Vocabulary through stories	34	85,0	6	15,0	40	100

Source: Survey.

In the survey applied students were asked about their preferences between group work and individual work. Most of the students 95.0% mentioned that they preferred group work, while a minority 5.0% preferred individual work.

Table 2, regarding the frequency with which students would like to perform activities, shows that 37.5% of students would never like to work outside the classroom, while 27.50% very frequently, 32.50% of students would like to use technological resources very frequently, likewise, 45.00% of students perform activities that involve body movement. As for using memorization methods, 30.00% of the students would like to use them frequently. On the other hand, 45.00% of the students prefer student-centered classes, and finally, 37.50% of the students would like to perform literary translations of paragraphs frequently.

Table 2

Activities that students prefer doing

Items	VF	%	F	%	O	%	R	%	N	%
Working outside the classroom	11	27.5	3	7.5	1	2.5	10	25.0	15	37.5
Using technological resources	13	32.5	10	25.0	3	7.5	5	12.5	9	22.5
Performing activities involving body movements	8	20.0	9	22.5	9	22.5	5	12.5	9	22.5
Using memorization methods	11	27.5	12	30.0	2	5.0	10	25.0	5	12.5
Having teacher-centered class	6	15.0	4	10.0	4	10.0	15	37.5	11	27.5
Having learner-centered class	18	45.0	9	22.5	7	17.5	3	7.5	3	7.5
Literary translation of paragraphs	15	37.5	7	17.5	5	12.5	4	10.0	9	22.5

Note: n=40. VF= Very frequently; F= Frequently; O= Occasionally; R= Rarely; N= Never.
Source: Survey.

Having gathered that key information, it was time, with the aid of a documentary study, to design a strategy that, based on Neurosciences, should help to improve the English language process in elementary students.

Strategy Based on Neuroscience to Help Improve the English Language Process in Elementary Students

Introduction

The following Neuroscience-based strategy is proposed for educational contexts where students need to be motivated, engaged, and learn the English language more effectively.

The strategy focuses on students struggling academically, such as those with wrong learning behavior, or lack of motivation, since they are transitioning from infancy to preadolescence. Regarding the research findings, the topics and activities that will motivate students are as follows: Abilities with “Can/Can’t”, Food and Drinks, and one of the most difficult topics is the verb ‘to be’.

General Objective:

To contribute to the teaching-learning process using Neuroscience in elementary students at 5 de Agosto school, in Esmeraldas.

Each activity in the strategy is divided into four stages, as explained below:

Warm-up: This phase is intended to engage the learners' minds and produce a positive emotional state for learning. Include a brief physical exercise linked to the topic, such as a quick dance or a movement game that teaches language associated with communicative skills. Engaging activities stimulate neural pathways, training the brain for cognitive tasks and language processing.

Presentation: The presentation phase involves presenting new concepts in a way that captures the audience's interest and improves memory retention. For example, listening to native or excellent English speakers introduces students to correct pronunciation and natural language patterns. It also gives real-life examples of language use, which improves comprehension and application in a variety of contexts.

Development: To foster learning, the development phase emphasizes active involvement, social contact, and repeated exposure. For instance, writing exercises increase language creation by allowing students to practice and reinforce previously

taught structures and language usage. Furthermore, it allows for targeted practice with grammatical rules, sentence construction, and general language correctness.

Wrap-up: The wrap-up phase aids in learning consolidation, encourages positive experiences, and provides an environment for reflection. Speaking exercises, for example, help with fluency development by promoting spontaneous replies and eliminating hesitancy.

To use Neuroscience to contribute to the linguistic development of elementary-level students at the "5 de Agosto" school, the following strategy is proposed:

Development

Activity 1

Topic: My Abilities

Objectives:

Students will:

- Express their abilities.
- Apply the concept of abilities in real-life situations, demonstrating an understanding of the context.
- Develop the ability to respond appropriately when others talk about their abilities.

Warm-up

One of the ways to activate the brain is to surprise the students. Before starting the class, the teacher could paste some images related to the subject around the classroom walls. That way the students will be curious to know what the planned activity or the topic of the class is.

Regarding the images, the following link may be of help: https://games4esl.com/wp-content/uploads/Can-Cant-Flashcards.pdf.

That way, when the students are in their seats, some questions can be asked by the teacher, for example:

- What do you think is today's class topic?
- What do the images on the walls refer to?
- With which of the images do you feel more identified?

Presentation

To start the class and make the students feel motivated, the following link (https://www.youtube.com/watch?v=6r3NdUC5g5g) may be used as a model, and the teacher can re-create their moves.

Mime questions are one of the most entertaining and exciting activities to complete at this level. The student will have one minute to recreate the number of possible abilities by miming each one. The top five learners with the most mimics will be rewarded.

It is essential to motivate with prizes. This might be sweets, bonus points, or something else.

Development

Collaborative Storytelling

Give them a subject or genre for a tale to get them started. The narrative might be about superheroes, mystical creatures, or a futuristic planet. This helps them concentrate their creativity. You could divide up the class according to your preference.

Begin the story with a sample sentence and have each student contributes with a sentence in order, building on the narrative. Encourage the use of descriptive language and the correct use of the words "can" and "can't." As needed, guide and correct language use. It is important to feed the student's imagination, and for that reason allow them to create materials that they could need with simple resources, such as paper crowns or superhero logos.

Wrap-up

Students will be able to narrate their stories, and they will be able to discuss the main characters, their unique abilities or powers, and the plot ending with the teachers' guide. Encourage reflection on the collaborative process and the use of language.

Activity 2

Topic: What Do You Prefer Fruit or Vegetables?

Objectives:

Students will:

- Develop an understanding of cultural aspects related to food.
- Expand their fruit and vegetable-related vocabulary.
- Improve students' ability to communicate effectively in English.

NOTE: This activity is divided into two different parts. The first one must be done in one hour class, for preparation. The final result will be presented in the next class period, another day.

Warm-up

To begin the class, students must be motivated, curious, and eager to learn something new. One of the activities that teachers can do to increase these emotions is to bring in real items, in this case, fruit and vegetables.

Divide the class into groups. Then, the teacher will go through each group and ask them to cover their eyes and bring out a fruit or a vegetable, such as a banana, an apple, a tomato, an onion, or a watermelon.

With their eyes closed, students will have the opportunity to guess the fruit or vegetable in front of them. They will be able to smell, feel its shape, and even taste it.

Presentation

Use visually appealing flashcards with pictures of various fruit and vegetables provided to the students' groups to classify them, all fruit together and vegetables in the same way, talk about their preferences, and finally generally about them.

The students must have didactic material with which they can experiment, or simply see; that is why images of fruit and vegetables are provided for the students to do the activity. Here, there is a link with images, which can be printed.
https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.ecognitiva.com%2Fatencion%2Frastreo-visual%2F&psig=AOvVaw0iYYz-u9oHcjGvxfzpYe7w&ust=1706204561346000&source=images&cd=vfe&opi=89978449&ved=0CBIQjRxqFwoTCMDerbnJ9oMDFQAAAAAdAAAAABAh

Development

Assign roles (customer, waiter, chef) and ask students to act out situations in a "restaurant". They can use English to order, ask questions, and discuss preferences.

Students will need to plan which dish they want to present to roleplay. They will also have to plan their script, costumes, and food dishes for different types of salads.

Students should agree on the salad plate they will bring to the classroom

Wrap-up

For the final part, this could be done in another class hour.

At the tasting and role-playing activity, students describe the flavors and textures, using descriptive language in English.

For example:

Group 1.

A: Can I have a fruit salad please?
Waiter: For sure!
B: I want a Caesar salad, please.
Waiter: Do you need anything else?
A few minutes later
A: My fruit salad is so delicious, the banana is sweet and soft, the kiwifruit is a bit acidic, and I love the apple, it is a little crunchy.
B: My Caesar salad is awful, the lettuce is very soft, but it is so salty, and the sauce is very spicy, I hate spicy food. I think I am not going to eat it.

Activity 3

Topic: Personal Information

Objectives:
Students will:

- Express personal information using the Simple Present tense and the verb 'to be.'
- Develop an understanding of how to use the Simple Present tense with the verb 'to be' in real-life situations.

Warm-up

Start with a short, fun activity related to personal information, such as a quick crossword puzzle or word association game. This prepares the brain for language learning.

Here are some links where you can find crossword puzzles or a word association game:

- https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.eslprintables.com%2Fvocabulary_worksheets%2Ffamily%2Ffamily_crosswords%2FPersonal_Information_and_Famil_508712%2F&psig=AOvVaw3fOg6C2-_cAWy3XfhYqNSn&ust=1706226345545000&source=images&cd=vfe&opi=89978449&ved=0CBIQjRxqFwoTCLD-jsya94MDFQAAAAAdAAAAABAY
- https://images.wordmint.com/p/Personal_information_1585960.png

The teacher can print out this activity to be done individually or as a group. However, it can also be carried on a poster, where students will have the opportunity to go to the board and complete the activity.

In order to motivate students to the English class, it is important to create a good atmosphere. To do this activity you could create a competitive environment. It is a good way to raise student interest. The following link you could use as background music (https://www.youtube.com/watch?v=tvlmlpNcppo).

Presentation

When it comes to grammar, it is usually a little complicated for students. This may be due to some aspects, such as when the teacher does not use innovative methodologies,

the teacher does not know how to explain grammar topics well, and students feel unmotivated.

For this reason, it is necessary to leave the traditional methodologies behind and make didactic materials that also serve to motivate students.

One option is to use interactive flashcards.

The teacher will have to print cards with the grammatical structure and sample sentences (Here is an example).

SUBJECT	+	VERB TO BE	+	COMPLEMENT
SHE		IS		TEN YEARS OLD
HE		IS		AN ARCHITEC
I		AM		FROM COLOMBIA

You can create in this way some more cards and distribute them in disorder. A good activity is a competition between groups. The group that takes the shortest time to arrange all the sentences wins.

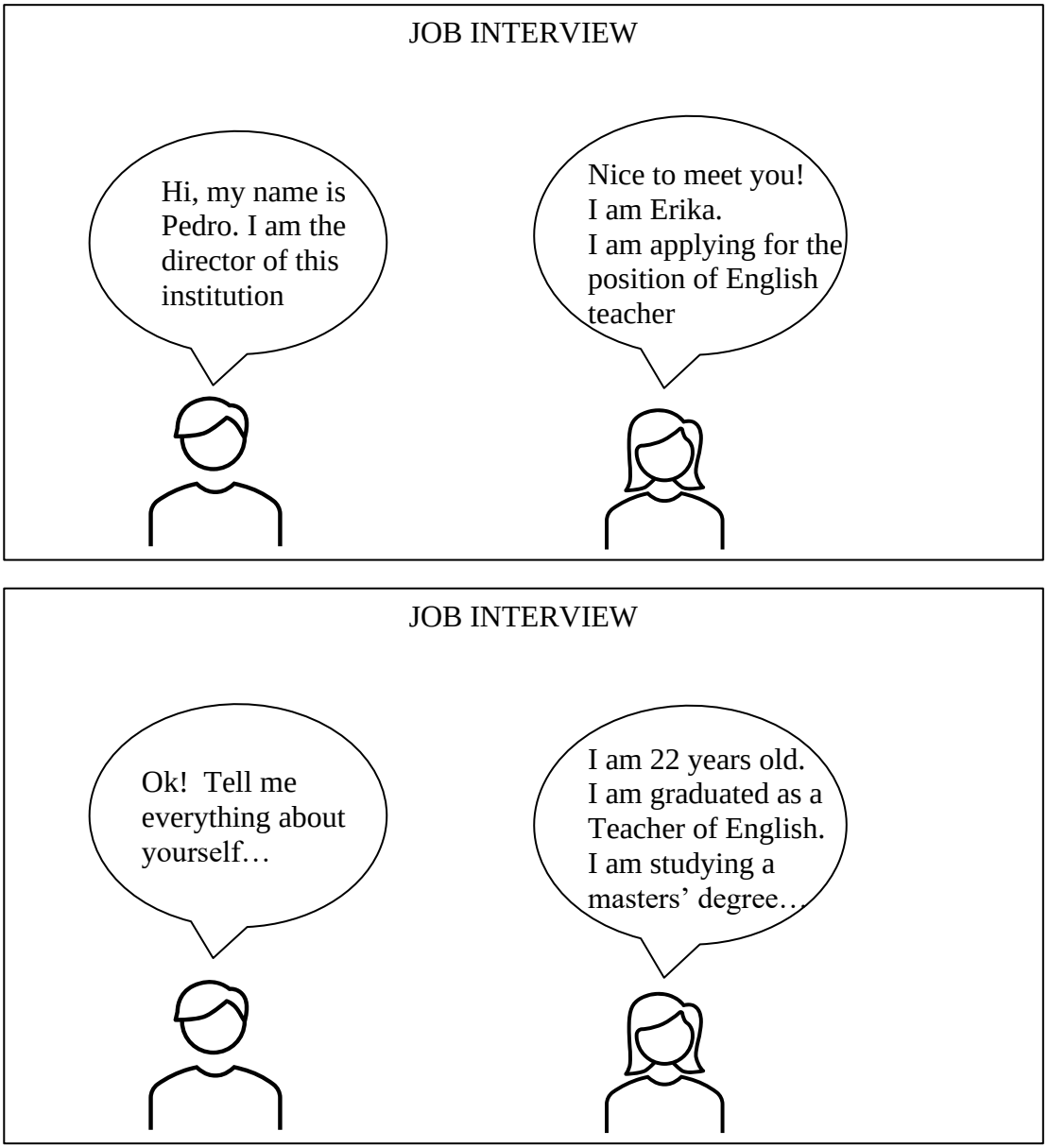
Development

Students will have to make a comic book showing the personal information of a family member (mom, dad, brother, uncle, grandparent, etc.) or you could create a character. Students should draw, paint, and write sentences using the verb to be, in order to create the comic with scripts, clouds of comments, or it can be narrated. It is recommended that students use only personal pronouns to practice grammar rules.

The idea is to create a history, it could be about people chatting at an airport, a job interview, making friends at a party, and some others.

This activity can be done individually, in pairs, or in groups, according to the number of students.

For example:



Wrap-up

Students will have to go to the board and present their comic book. In the presentation, they will have to talk about the main idea of the comic, the characters and finally they will have to read in front of the whole class their comic.

CHAPTER IV

DISCUSSION

To determine the contents to be taught using Neuroscience in the real context, an interview was conducted with the English teacher in charge of that level. She was able to show that among the topics that students liked were can/can't, fruit and vegetables, and the verb “to be”.

Several investigations showed an increasing interest in using Neuroscience to improve language teaching methods. Gunawan's (2019) study in Indonesia showed the benefits of combining neurological concepts into English language education, resulting in significant improvements in grammar skills and general engagement. Similarly, Kumar and Patki's (2022) study stressed the effectiveness of a multisensorial strategy that adhered to brain-based learning principles.

In terms of communicative abilities, Dominguez (2022) points out that by listening and speaking in class with other classmates and listening to music, students will lose their fear of interacting in class. Therefore, the teacher interviewed mentioned that the skills she worked with the most were listening and speaking so that students become familiar with the English language and learn through communicative teaching.

Gunawan's (2019) study on teaching the verb 'to be' to Indonesian university students shares similarities with our findings from an interview with the teacher. Both sources emphasize the difficulties that students have when addressing the use of the verb 'to be' and, more broadly, with personal pronouns. Gunawan's findings on applying Neuroscience principles to grammatical English teaching align with the interviewee's perceptions of these topics as challenging for elementary students. This conclusion supports the relevance and applicability of Neuroscience-based approaches to specific learning challenges, providing a solid foundation for implementing effective pedagogical strategies in the classroom.

Accordingly, to identify the type of activities that students would like to use to activate learning, a questionnaire was applied to the elementary students. The survey results show elementary students' preferences and attitudes regarding linguistic abilities, educational techniques, and work dynamics, which are useful for developing successful language teaching tactics.

Students' listening preferences and vulnerability to emotional impacts are quite similar to neuroscientific theories. Oktar (2006) emphasizes the relationship between cognitive activity and underlying physical processes in the brain, emphasizing the role of reward, motivation, and decision-making in the learning process. Similarly, Sousa (2010) underlines the need to integrate Neuroscience, education, and psychology to understand how the brain learns efficiently. Students' preference for listening and their response to emotional stimuli are consistent with the idea that paying attention to emotional aspects and providing multimodal experiences enriches the learning process, thus supporting fundamental principles presented in education and Neuroscience.

The comparison of collaboration between groups and influence acceptance in arts activities emphasizes the necessity of active engagement and various methods to learning in achieving successful learning outcomes. Students benefit from collaborative settings in which they may share their knowledge, skills, and viewpoints. Peer teaching and influence acceptance represent procedural and declarative learning, respectively, stressing skill application and knowledge development. According to Collins (2018), by combining declarative (such as summarization) and procedural (such as peer teaching and real-world practice) learning pathways, teachers may build dynamic learning environments that foster deep understanding and skill development. Ultimately, adopting these techniques enhances learning results while also encouraging students' creativity and critical thinking.

Students may see the classroom as a more organized place that provides more assistance, which promotes skill development. Furthermore, the preference for in-class activities may be related to Neuroscience theory, which emphasizes the relevance of comfort and familiarity for successful learning. Integrating environmental psychology concepts and discoveries into educational space planning and design may have an important influence on learning experiences and student well-being.

According to Roth (2000), by understanding how the physical and social environment influences student behavior and learning, educators may create more effective learning environments that promote cognitive, emotional, and social development. In addition, knowing how human conduct may impact the educational environment emphasizes the importance of developing environmental responsibility and commitment in the educational community.

An innovative strategy was designed based on Neuroscience. The strategy combines Neuroscience, brain-based learning, motivational theories, and sociocultural approaches, demonstrating an interdisciplinary approach to language instruction.

The warm-up phase of the strategy integrates strategies based on Neuroscience and cognitive psychology to optimize learner engagement and cognitive readiness for learning. By engaging multiple senses through sensory guessing games, incorporating crossword puzzles or word association games to activate attention and cognitive processes as mentioned by (Smith & Gasser, 2005), and incorporating surprise and curiosity to stimulate the reticular activating system (RAS) in the brain, educators create a rich learning environment that enhances memory retention, linguistic analysis, and attention (Willis, 2010). These warm-up activities prepare the neural pathways of learners as well as mentions (Oakley et al., 2021) for optimal learning, fostering deeper engagement and improving overall learning outcomes in language acquisition contexts.

The presentation phase of the strategy includes dynamic modeling and miming exercises, which use visual and kinesthetic learning modalities to reinforce language concepts and enable neural connections as mentioned (Jensen, 2008). Educators promote embodied cognition by involving pupils in interactive exercises such as miming, in which physical motions aid language knowledge. Additionally, visually appealing flashcards are used to identify fruits and vegetables, leveraging visual learning modalities to improve vocabulary acquisition and categorization abilities (Smith & Gasser, 2005). These visual aids give actual representations of linguistic concepts, which helps with comprehension and memory storage. Furthermore, interactive flashcards are used to teach grammatical structures, providing both visual and aural stimuli to improve understanding and memory retention (Haines, 2013).

In the development phase of the strategy, collaborative storytelling is promoted since it encourages social engagement and provides repeated exposure to language structures, which assists in memory consolidation and language learning (De la Barrera & Donolo, 2009). This approach allows students to actively engage with language in a group context, which promotes meaningful interactions and the internalization of linguistic patterns. Furthermore, role-playing in a restaurant environment is used to improve language production and communication skills in interactive, real-world settings

(Vygotsky, 1978). This practice promotes realistic language use and fluency by immersing students in real-world settings. Furthermore, constructing a comic book story is used to promote creativity and language production while reinforcing grammatical principles in context (Collins, 2018).

In the wrap-up phase of the strategy, reflection, and discussion are fostered to facilitate language practice and reinforce learning through vocal expression. This phase combines taste and descriptive language exercise, which promotes sensory engagement and linguistic fluency through experiential learning (Roediger & Karpicke, 2006). By actively engaging children in sensory experiences connected to the use of language, this technique improves their capacity to explain and communicate effectively. The wrap-up phase also facilitates peer presentation and reflection, which promotes metacognitive awareness and linguistic fluency through collaborative learning experiences (Boud & Falchikov, 1989). Through peer engagement and self-reflection, students solidify their language abilities while obtaining insights into their learning processes, eventually contributing to their language competence growth.

CHAPTER V

CONCLUSIONS

The lack of expertise in Neuroscience and psychology among educators poses a serious problem in the field of language learning. Teachers, who are often committed and enthusiastic about their profession, may find themselves ill-equipped to understand and use the mechanisms of the brain during the learning process. Without adequate training in these fields, teachers may miss the opportunity to tailor their teaching methods to the individual needs and preferences of their students.

Understanding learners' emotional states is critical in English Language Teaching because it affects their engagement, motivation, and receptivity to learning information. Using Neuroscience findings, instructors may customize their lessons to individual learning styles, ensuring that every student understands and retains the information. To do this, it is critical to understand which topics elementary students are most motivated to study or find hardest to comprehend in nowadays' world. By applying Neuroscience concepts, educators may create classes that address their students' cognitive and emotional requirements, resulting in more meaningful and successful learning experiences. This technique allows instructors to optimize the learning process and improve children's language acquisition in the primary classroom.

As education advances constantly, Neuroscience can bridge the gap between scientific findings and practical teaching approaches. Teachers may develop activities that increase student engagement and learning results by knowing how their brains learn best. This goes beyond just having fun, since research-backed methodologies allow for personalized education, resulting in a dynamic and successful English learning environment. Finally, incorporating Neuroscience provides teachers with the skills they need to negotiate the complexity of modern education and innovate their approach, creating a more effective and exciting experience for students as well as teachers.

The suggested strategy provides a complete personalized approach to teaching English to elementary students, based on Neuroscience, motivational theories, and sociocultural views. It seeks to provide an enriched learning environment that fits students' cognitive and emotional needs, resulting in a positive and effective language learning experience. The objective of developing an innovative Neuroscience-based

technique to improve English language processing in elementary school students corresponds with this viewpoint since it aims to build a teaching approach that maximizes learning and promotes a dynamic and effective learning environment.

RECOMMENDATIONS

This recommendation is directed to headteachers or directors from public and private institutions in Esmeraldas city. A solid understanding of the brain mechanisms underlying learning, memory, and cognitive functioning provides educators with useful insights for improving their teaching methods. This author suggests incorporate Neuroscience into teacher training because educational institutions may empower teachers to adopt evidence-based methods that are consistent with the brain's natural functions.

To teachers. The incorporation of Neuroscience into teacher education becomes more than a recommendation; it is a must to guarantee that educators are well-prepared to tackle the difficulties of modern classrooms and deliver optimal learning experiences for their students.

Create language teaching practices that are aligned with students' preferences, hence increasing engagement and motivation. Incorporate group participation, emotional effect, and artistic activities into your class preparations. By adapting teaching approaches to students' interests, educators may create a more dynamic and participative learning environment.

To future investigators. The implementation of the focus group approach would have been required to further analyze the results and achieve a more particular and thorough knowledge of students' preferences and requirements during the English teaching-learning process. This method would have allowed us to go further into the underlying causes of the preferences found in the survey, providing useful qualitative insights into the students' unique experiences, and allowing for the expression of additional ideas, experiences, and suggestions that could have significantly improved our understanding of the relationship between Neuroscience and elementary English language teaching.

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APPENDIX

Appendix A

Objectives	Variables	Conceptual definition	Operational definition	Dimensions	Indicators	Techniques	Items
To determine the contents to be taught using Neurosciences in the real context of English Language Teaching to elementary students.	DEPENDENT The contents to be taught INDEPENDENT Neuroscience	The topic or ideas included in something written, stated, made, or represented. Cross-disciplinary research that investigates the nervous system, including its diverse characteristics and specialized functions.	The study schedule and classroom activities are based on Neuroscience research to teach English language skills to elementary students. Activate the brain and students can learn the English Language trough Steps or techniques	Grammar Vocabulary Motivation Adaptability Lesson Plans Strategies Methods	Information retention Technology integration Learning Assessment	Interview	7
To identify the type of activities that students would like to use in the English class to activate learning.	DEPENDENT The English Language Teaching	The practice of teaching English to those who speak another language.	Master the English Language	Interactivity and participation Variety of activities Accessibility and required resources Flexibility and adaptability	Analysis of class plans Resource evaluation Classroom observations	Questionnaire	6

To design an innovative strategy based on Neurosciences to improve the English teaching process in elementary students.	INDEPENDENT Activities that students would like to use DEPENDENT English Teaching INDEPENDENT Innovative Strategy based on Neuroscience	The various teaching strategies and educational activities used by teachers to engage students The practice of teaching English to those who speak another language. A novel approach to English language instruction that integrates insights from Neuroscience research to optimize learning outcomes for elementary students.	The specific types of activities implemented by teachers during English lessons Master the English Language The specific components and methodologies incorporated into the innovative strategy, such as brain-based learning techniques, multisensory activities, gamification, and personalized instruction.	Neuroscience Principles Integration Pedagogical Innovation Technological Integration Cognitive Engagement Motivation and Interest	Teacher Training and Professional Development Student Performance Data Technology Implementation Assessment		

APPENDIX B

INTERVIEW

OBJECTIVE: To determine the contents to be taught using Neuroscience in the real context of English Language Teaching to elementary students.

1. Do you think Neuroscience influence students' learning? How?
2. Would you be willing to apply Neuroscience-based activities for English teaching?
3. Which of the skills do you use most often to teach English?
4. What are the activities, resources, didactic material, or techniques that you use to teach grammar to students?
5. Which grammar topics do students find more difficult to learn?
6. What vocabulary topics do you consider to be the ones in which the students are more motivated to learn?
7. Which vocabulary topics do you consider conductive to apply Neuroscience in the classroom?

APPENDIX C
QUESTIONNAIRE

OBJECTIVE: To identify the type of activities that students would like to use in the English class to activate learning.

1. Which language skill do you consider to be your favorite?

   LISTENING SPEAKING READING WRITING

2. Do you consider that your emotional state influences the learning process?

   YES NO

3. Would you like to participate in activities that connect the English language with music or art?

   YES NO

4. Do you enjoy learning vocabulary through stories or narratives in English?

   YES NO

5. Do you prefer group or individual activities in English class?

   GROUP ACTIVITIES INDIVIDUAL ACTIVITIES

6. How often would you like the teacher to perform the following activities?

ITEMS	Very Frequently	Frequently	Occasionally	Rarely	Never
Working outside the classroom					
Using technological resources (computers, tablets, cell phones, televisions, etc.).					
Performing activities involving body movements (dancing, miming)					
Using memorization methods					
Having teacher-centered class					
Having learner-centered class					
Literary translation of paragraphs					

APPENDIX D

REVISION OF DOCUMENTARY STUDIES

How to collect information?

Document title	Author/s	Relevant information collected