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El impacto de la neuroplasticidad en el aprendizaje del vocabulario en inglés como adquisición de segunda lengua

The Impact of Neuroplasticity on Learning English Vocabulary as a Second Language Acquisition

O impacto da neuroplasticidade na aprendizagem do vocabulário inglês como aquisição de segunda língua

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Resumen

Este estudio investiga el impacto de la neuroplasticidad en la adquisición de vocabulario en inglés como segunda lengua, enfatizando el papel de las técnicas de atención plena en la mejora de los resultados del aprendizaje de idiomas. A través de una encuesta realizada entre 30 profesionales de la enseñanza del inglés y la psicopedagogía, la investigación explora las percepciones sobre la efectividad de las intervenciones basadas en la neuroplasticidad y las prácticas de mindfulness en la adquisición de vocabulario en inglés. Los hallazgos revelan que los profesores generalmente reconocen que la neuroplasticidad influye positivamente en el aprendizaje de idiomas. Sin embargo, las opiniones de los docentes varían sobre su efectividad y la necesidad de incorporar estos principios en sus metodologías de enseñanza. En cuanto a las técnicas de mindfulness, la mayoría de los profesores coincidieron en que puede ayudar a mejorar el compromiso y la flexibilidad cognitiva de los estudiantes, destacando la importancia de considerar la edad como un factor que influye en la eficacia de la neuroplasticidad en la adquisición del lenguaje. En general, los resultados subrayan el efecto positivo que puede tener la integración de la neuroplasticidad y la atención plena en el plan de estudios del idioma inglés y la necesidad de desarrollo profesional y capacitación para cerrar la brecha entre la teoría y la práctica.

Palabras clave: inglés segunda lengua; neuroplasticidad; consciencia.

Abstract

This study investigates the impact of neuroplasticity on the acquisition of English vocabulary as a second language, emphasizing the role of mindfulness techniques in enhancing language learning outcomes. Through a survey conducted among 30 professionals in English teaching and Psychopedagogy, the research explores perceptions regarding the effectiveness of neuroplasticity-based interventions and mindfulness practices in English vocabulary acquisition. The findings reveal that teachers generally acknowledge that neuroplasticity influences language learning positively. However, teachers' opinions vary on its effectiveness and the need to incorporate these principles in their teaching methodologies. Regarding the mindfulness techniques, majority of teachers agreed that it can help improve student's engagement and cognitive flexibility highlighting the importance of considering age as a factor that influences the effectiveness of neuroplasticity in language acquisition. Overall, the results underscore the positive effect that integrating

neuroplasticity and mindfulness into English language curriculum can have and the need for professional development and training to bridge the gap between theory and practice.
Key words: English second language; neuroplasticity; mindfulness.

Resumo

Este estudo investiga o impacto da neuroplasticidade na aquisição de vocabulário de inglês como segunda língua, enfatizando o papel das técnicas de mindfulness na melhoria dos resultados de aprendizagem de línguas. Por meio de uma pesquisa realizada com 30 profissionais do ensino de inglês e da psicopedagogia, a pesquisa explora percepções sobre a eficácia de intervenções baseadas na neuroplasticidade e práticas de mindfulness na aquisição de vocabulário em inglês. As descobertas revelam que os professores geralmente reconhecem que a neuroplasticidade influencia positivamente a aprendizagem de línguas. No entanto, as opiniões dos professores variam quanto à sua eficácia e à necessidade de incorporar estes princípios nas suas metodologias de ensino. Em relação às técnicas de mindfulness, a maioria dos professores concordou que estas podem ajudar a melhorar o envolvimento e a flexibilidade cognitiva dos alunos, destacando a importância de considerar a idade como um fator que influencia a eficácia da neuroplasticidade na aquisição da linguagem. No geral, os resultados sublinham o efeito positivo que a integração da neuroplasticidade e da atenção plena no currículo de língua inglesa pode ter e a necessidade de desenvolvimento profissional e formação para colmatar a lacuna entre a teoria e a prática.
Palavras-chave: Inglês segunda língua; neuroplasticidade; atenção plena.

Introduction

There are many important factors when we mention neuroplasticity and its implications in education (Cunnington, 2019) one of them is an enriched environment which is a combination of learning, memory, and social interactions; mindfulness as a means of sensory stimulation could be a tool that would contribute to neural development and stimulation of the limbic association area.

Mindfulness practices, such as meditation and focused attention, can foster a heightened state of awareness and cognitive flexibility, which are crucial for processing and retaining new vocabulary (Zeidan et al., 2019). By integrating mindfulness into language learning strategies, educators can create an environment that not only promotes linguistic proficiency but also supports the mental adaptability necessary for mastering a second language.

Recent studies have highlighted the role of mindfulness techniques in enhancing neuroplasticity, thereby improving language acquisition outcomes. Tortella et al., (2021) in their article about mindfulness and neuroscience-based proposals, found some research where mentioned that a short-term, being this -30 days, the practice of mindfulness-induced grey matter plasticity, this suggests changes in the ventral posterior cingulate cortex, which is significantly associated with cognition, emotion, self-awareness, additionally, they support this with another research in which a report presented a participant submitted in an eight-week program of mindfulness, the results showed in an Anatomical Magnetic Resonance (AMR) an increase in the grey matter concentration in the left hippocampus and the posterior cingulate cortex, also in the temporoparietal junction and the cerebellum, these important areas of the brain involved memory, learning process and emotion regulation (Hölzel et al., 2011, as cited in Tortella et al., 2021).

Learning a second language requires different mental and cognitive processes and it is mainly influenced by the brain's inherent ability to adapt and reorganize itself, by forming new neural connections throughout life (Innocenti, 2022) and a reorganization, which is called neuroplasticity. In the case of second language learning, Vukovic et al. (2021) stated that even short-term exposure to the target language can induce rapid microstructural alterations in the brain, particularly in areas associated with semantic processing, such as the prefrontal and temporal cortices (Isel, 2021).

According to Puderbaugh and Emmady (2023), neuroplasticity plays a pivotal role in the acquisition of a new language. Mateos-Aparicio & Rodríguez-Moreno (2019, p. 66) also defined neuroplasticity as the ability of the nervous system to change its activity in response to intrinsic or extrinsic stimuli by reorganizing its structure, functions, or connections. In this, Education is involved as first example of extrinsic stimulation; it means that every process of acquiring something new involves neuroplasticity in our brain.

Pioneer neuroscientist Marian Diamond (Davidson Films, Inc.,2010) was amazed with the brain structure, she stated that the brain is the most miraculous mass of protoplasm in the world and, perhaps, in the entire galaxy, and its potential is virtually unknown. Mentioning that the cells in it under ideal circumstances can remain active and healthy for at least 100 years, she mentioned that this can happen if we learn how to enrich our brains.

However, the effectiveness of neuroplasticity in second language learning is not uniform. Learning a second language is influenced by various factors such as age, motivation, and learning methodologies. These factors can facilitate or impede the development of the brain’s adaptive

capabilities. Highlighting the intricate dynamics involved in mastering a new language, such as vocabulary or grammar acquisition, speaking fluency and even listening skill. Understanding the relationship between neuroplasticity and language acquisition not only enhances our comprehension of cognitive processes but also informs the development of effective vocabulary learning strategies.

Based on the background information, this research aim is to explore neuroplasticity in the vocabulary acquisition in second language. In order to obtain a clear understanding of what is known about neuroplasticity and its application within the area of English Language Teaching, this paper was developed with a quantitative approach aimed at professionals in the area of English Language Pedagogy and Psychopedagogy, as well as with the input of experts in the area of research for the approval of the instrument.

To provide validity to this research, the following statements will offer more detailed information on the key words and other important statements in the development of the topic.

Literature Review

Limbic System

The Limbic System (Torrico & Abdijadid, 2023) is an aggregation of brain structures that are generally located lateral to the Thalamus, underneath the Cerebral Cortex, and above the brainstem, also known as the one who is in charge of managing emotions, behaviors, feelings and others.

The Limbic System plays a crucial role in the learning process by integrating emotional and motivational aspects with cognitive functions. Brooks proposes a "limbic comparator" hypothesis, suggesting that the limbic system aids motor learning through interactions with sensorimotor systems, where the amygdala's relevance-sensitive inputs help refine motor skills by signaling errors during learning transitions (Brooks, 1986)

There are four main structures of the limbic system, Felton (2022) states its roles as: the hypothalamus which produces hormones, helps to sleep, temperament management, hunger and thirst, blood pressure, body temperature, and heart rate. The amygdala plays a role in how a person experiences emotions and feelings (like anxiety, anger, and fear), memory, and social interpretations (information about others). The thalamus which processes sensory information (hearing, taste, sight, and touch) and helps with memory, planning, and emotions and finally the hippocampus which is responsible for our ability to form new memories.

Together, these studies illustrate the limbic system's multifaceted contributions to learning and memory, Dr. Mary W (2024), states that it helps to regulate emotional and social processing, as well as learning, motivation and memory. Indeed, it has an important role in this study, because the damage of this important structure can cause several injuries in the brain, (Mary West, 2024) because its structure lies beneath the outer, wrinkly part of the brain and above the brain stem.

Porr et al. highlights the limbic circuit's involvement in response vigor, indicating that dopamine pathways energize behavior, which is essential for learning through action selection and motivation (Porr et al., 2019). Von Cramon and Hebel emphasize the importance of limbic structures in managing associative memory, noting that lesions in these areas can lead to significant learning deficits, thus underscoring their role in cognitive processing (Cramon & Hebel, 1989)

Baev discusses how hierarchical levels within the limbic system contribute to learning by processing various afferent signals, enhancing control over behavior (Baev, 1998). Lastly, Port et al. explores the hippocampal formation's contributions to associative learning, suggesting that specific pathways modulate learning processes and memory expression (Port et al., 1990)

Neuroplasticity-Based Techniques

This term is a fundamental in this research paper, because it shows the aspect of how individuals adapt to new linguistic environments (Wei et al., 2023). Research has shown that engaging in diverse language practices can lead to significant alterations in Brain Structure, particularly in areas associated with language processing, memory, and functional adaptations.

In Structural Changes in the Brain there are some aspects that are involved in this as an example: White Matter Connectivity, in here studies show significant increases in white matter connectivity within language networks during L2 learning, particularly in the left-hemispheric lexical-semantic system (Wei et al., 2023). In addition to this the Interhemispheric Dynamics is involved in which, learning a second language reduces connectivity in the corpus callosum, suggesting a shift in how the brain processes language, favoring the dominant left hemisphere for L2 tasks (Wei et al., 2024).

While Neuroplasticity-Based Techniques significantly aids in L2 vocabulary acquisition, it is essential to recognize that age and prior linguistic experience can influence the extent of these changes (Medina, 2023). Older learners may experience different cognitive effects compared to younger individuals, highlighting the complexity of language learning processes.

As the structural changes the brain also has its Functional Adaptations which are the Cognitive Demand (CD) and the Experience-Dependent Changes (EDC), in the Cognitive Demand

Neuroplasticity allows the brain to adapt to the cognitive demands of learning a new language, enhancing overall cognitive function (Hardacre et.al, 2022), meanwhile the Experience-Dependent Changes is the brain's ability to reorganize itself in response to L2 learning is evident, with changes occurring rapidly in response to intensive training (Isel, 2021).

Indeed, it has to be with the learning process. When we start a leaning process, each lesson has a potential to create new connections in the brain, (Ackerman, 2018) also, it could make changes in the brain's default mode of operation, it brings the possibility of adapting and restructuring behaviors, thoughts, etc.

Mindfulness Techniques

The action to be fully aware or be in the present, living the moment is also known as mindfulness, Crystal Hoshaw, (2022) cited that it is the practice of gently focusing your awareness on the present moment over and over again. Mindfulness practices have been shown to significantly influence neuroplasticity, leading to both structural and functional changes in the brain. Research indicates that mindfulness meditation training (MMT) can enhance attention and reduce stress and anxiety, correlating with increased activity in brain regions such as the hippocampus and frontal areas, as well as improved white matter microarchitecture (Álvarez et al., 2023)

In addition, mindfulness-based interventions have been linked to increased reconfiguration of functional networks, particularly executive control, default mode and salience networks, suggesting that regular practice promotes neuroplasticity and cognitive improvements (Yue et al., 2023). With the help of these functions, the learner can be more focused and receptive when receiving the lecture, leading to better academic performance.

Despite the lack of information to support mindfulness in self-regulation in the acquisition of English as a Second Language (ESL), there is a significant amount of research that supports mindfulness as a technique to increase ESL performance. Chareonsukmongkol (2019) carried out research on Thai college students in which the results showed that students who reported that the students who used mindfulness techniques meanwhile presenting an English speech, reported less anxiety during their presentation, and obtained higher scores than the ones who reported high anxiety and did not use the techniques.

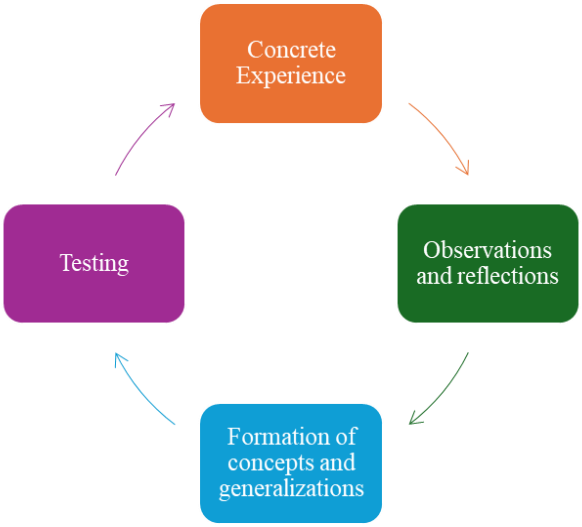
This study suggests what Skelly & Estrada-Chichon (2021) states that Mindfulness Techniques not only can help reduce stress and anxiety as general feelings, indeed it can help to reduce language-specific anxiety, and as a result it is a big improvement in EFL performance.

Kolb's Learning Style

Kolb's Learning Style or also known as the Experiential learning Model (Kolb, 1981) is the contextualization of human growth and development, synthesized the learning process into a consistent structure, provides a concrete explanation of how neuroplasticity works in the learning process. Knowing that neuroplasticity is the adaptation of our brain to the stimuli of our environment (Wei et al., 2023) and above all to the experiences lived in it.

Kolb's learning cycle shows how this process develops, it is aligned with neuroplasticity from the observation and analysis of the new stimulus to the execution and internalization of the same to define and create a new memory of what has been learned, (Hardacre et.al, 2022) contributing to the brain structural change and functional adaptations, and likewise with mindfulness, since what makes this theory effective is that the student is aware and present at the moment in which learning is taking place.

Figure 1, *Kolb's Learning Style Cycle*



Note. This figure reflects the cycle of learning process. The reference was taken from (https://www.simplypsychology.org/learning-kolb.html)

Kolb's manifest that concrete experience (Saul McLeod, 2022) refers to when the learner encounters themselves with new experiences, situations, or a reinterpretation of a past experience with new knowledge. Observation and reflection (Kolb, 1981) refers to when the learner reflects

on the new experience based on their existing knowledge; following this pattern, abstract conceptualization is when the person has learned from his experience.

Finally, experimentation refers to when the learners based on the concept formed apply their ideas and experiment with the world around them.

English Vocabulary and Second Language Acquisition

The acquisition of English vocabulary in second language learners is a multifaceted process influenced by various strategies and cognitive theories. These theories include various frameworks that describe how people take in information, learn, and gain understanding. Jean Piaget's Cognitive Learning Theory, especially important in early childhood education, focuses on how learners actively build knowledge through their experiences, emphasizing stages like the sensorimotor and preoperational stages (Sriastuti & Masing, 2022). Additionally, Cognitive Theories address the pros and cons of cognitive development, claiming that intelligence can change and develop through biological growth and life experiences (Alahmad, 2020).

The Cognitive-Behavioral Method deepens this insight by combining emotional and behavioral elements, emphasizing frameworks such as Beck's cognitive theory and mindfulness therapies, which show how thought and action interact (*Cognitive-Behavioral Theories*, 2022). Moreover, cognitive learning theories, such as latent learning and information processing, highlight how the brain interprets and processes information, setting them apart from behaviorist methods (Çelikö, et al., 2019), these theories together offer a complete structure for grasping cognitive functions and how they affect education and therapy.

There are many processes involved in the acquisition of English vocabulary, Broca's area, and Wernicke's area, these areas are in charge of speech production, articulation, language development, and comprehension (Unbabel Team, 2019). Neuroscience has a lot to do with it, Skelly & Estrada mentioned that Vogel et al., carried out a study using Functional Magnetic Resonance Imaging (fMRI) of neural activity (Vogel et al. 2018, as cited in Skelly & Estrada-Chichon, 2021). They found that when individuals are learning new information such as a second language, this is encoded by the hippocampus as a new episodic memory, where a new schema (an associative network structure) in the brain is then created for this information.

According to Krashen, language learning is a conscious process where individuals are aware of what they are learning. In contrast with this, he argued that language acquisition is an unconscious process in which people are not aware that they are actually acquiring a foreign language and while

using it they are gradually developing (Krashen, 1982, as cited in Skelly & Estrada-Chichon, 2021). This suggests that the acquisition of English vocabulary or second language acquisition is a complex process where the brain is not working just as a machine but as an entire system with its own rules.

Each of the literature reviewed will contribute significantly to the development of this article, since from the limbic system that shows us how functions develop within the brain, in which neuroplasticity has an important role in the development and formation of information within it, where the use of techniques such as mindfulness can enhance and be of great help for the acquisition of progressive learning. This is aligned to Kolb's theory which, by analyzing it, shows how neuroplasticity and mindfulness can be present in meaningful learning. All this leads us to have a broader view of the importance of each of the topics reviewed in the acquisition of English vocabulary.

Methodology

This research paper was approved by the Institutional Review Board, and the instrument used was reviewed and approved by experts in the field. Following key ethical considerations (Bhandari, P., 2024) which were to protect the rights of research participants, enhance research validity and maintain scientific integrity. In addition to this the professionals surveyed were aware of the voluntary participation, informed consent, anonymity, confidentiality, and that the results will be public and for academic use only.

This research was carried out with a Quantitative Approach, according to Bandari (2020), quantitative research is the process of collecting information and analyzing it based on numerical data. There are three different quantitative research methods (McCombes, S., 2023, June 22), which are: descriptive, correlational, and experimental methods. This research focused on describing the results from the data obtained, knowing that the aim of Descriptive Methods includes a variety of approaches aimed at summarizing and providing characteristics of data without making inferences beyond the data set ("Descriptive Statistics", 2023). Thus, descriptive methods serve as foundational tools in quantitative research, facilitating the analysis and interpretation of data.

The instrument applied in this research was a survey addressed to teachers in the area of English as well as experts in the area of Psychopedagogy and Education, with a Quantitative Approach. This survey was conducted in order to get a broader view of the impact that neuroplasticity can

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have on English vocabulary acquisition. The survey was constructed based on three domains which were: English vocabulary acquisition, mindfulness and neuroplasticity, each of which consisted of three questions focused on a specific objective.

Each domain was constructed based on the need to code the information, not only to make it easy to understand but also facilitates the acquisition of clear and concise data. The goal for each domain was designed to fully meet the set objectives while also offering a complete overview of the results obtained from each specific area.

In order to be able to apply the survey it had to be validated first as a questionnaire by two experts in the area of research and education. Yussoff MSB, mentioned that the acceptable Content Validity Index (CVI) for two experts is at least 0.80 values (Davis, 1992, as cited in Yussoff MSB, 2019).

Table 1. *The relevance ratings on the item scale by two experts*

Questionnaire Content Validation

Domain: English vocabulary acquisition	*Relevance*				
Item 1	*Expert 1*	*Expert 2*	*Expert in agreement*	*I-CVI*	*UA*
On a scale of 1 to 5, being 1 the minimum and 5 the maximum. To what extent do you agree that the English vocabulary acquisition could be impacted by neuroplasticity?	4	4	2	1	1
On a scale of 1 to 5, being 1 the minimum and 5 the maximum. Do you consider important to study the role of neuroplasticity in the acquisition of English as a second language?	4	4	2	1	1
. On a scale of 1 to 5, being 1 the minimum and 5 the maximum. Do you consider pivotal in the acquisition of English vocabulary the use of neuroplasticity-based techniques?	3	4	2	1	1
Item 2 Neuroplasticity					
How often do you incorporate neuroplasticity principles into your teaching methods for English vocabulary acquisition?	4	4	2	1	1
To what extent do you agree that age influences the effectiveness of neuroplasticity in learning English vocabulary?	3	4	2	1	1

On a scale of 1 to 5, being 1 the minimum and 5 the maximum. How effective do you believe neuroplasticity based interventions could be enhancing English vocabulary acquisition among second lang	4	4	2	1	1
Item 3 Mindfulness					
On a scale of 1 to 5, being 1 the minimum and 5 the maximum. How effective do you believe mindfulness interventions in a class could be beneficial in the acquisition of English vocabulary?	4	4	2	1	1
Do you use mindfulness techniques in your class?	3	4	2	1	1
Based on your experience. Do you think that it is important incorporates mindfulness in classes?	4	4	2	1	1
			S-CVI/Ave	**1**	
Proportion relevance	1	1	**S-CVI/UA**		**1**
S-CVI Average based on proportion relevance		**1**			

Note: The definition and formula were based on "ABC of Content Validation and Content Validity Index Calculation" by Yussoff MSB (2019). https://eduimed.usm.my/EIMJ20191102/EIMJ20191102_06.pdf

Based on the calculation of the Scale-level Content Validity Index based on the Average Method (S-CVI Ave), S-CVI Ave Based on Proportion Relevance, and Scale-level Content Validity Index based on the Universal Agreement Method (S-CVI/UA Ave), the questionnaire meets satisfactory level with a 1 value. Thus, giving way to the pilot test, in which were surveyed 10 professionals.

In here were surveyed 5 English teachers, 2 Psychopedagogues, and 3 English teachers with a master's degree in Psychopedagogy, Yussoff MSB (2019) suggested that the minimum acceptable Content Validity Index (CVI) for at least 9 experts was at least 0.78%. Based on the calculation made with Cronbach, the Frequentist Scale Reliability Statistics fulfilled expectations with a point estimated of 0.87% to follow the next steps.

After the pilot test, the final test was conducted for a population sample of 30 people: 19 Professionals in English teaching, coded as **(S1)**, 3 Professionals in Psychopedagogy, coded as **(S2)**, and 8 Professionals in English teaching with a master's degree in Psychopedagogy, coded as **(S3)**. Questions within the survey had the option to choose from 1 with this being Strongly disagree

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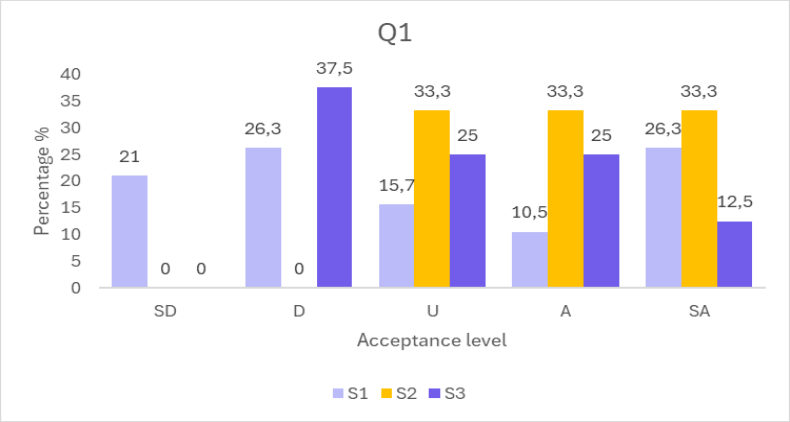
coded as **(SD)**, 2 Disagree coded as **(D)**, 3 Uncertain coded as **(U)**, 4 Agree coded as **(A),** and 5 Strongly Agree coded as **(SA)**.

Results

First domain 'English vocabulary acquisition,', with 3 questions covers the research question: What is the impact of neuroplasticity on English vocabulary acquisition?

In addition to this it also covers one specific objective: To study the role of neuroplasticity in the acquisition of English vocabulary as a second language.

Figure 2. *English vocabulary acquisition impact by neuroplasticity*

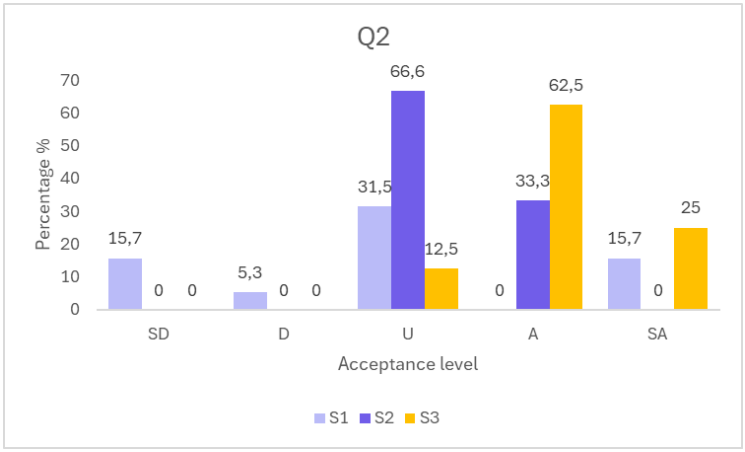


Note: Question 1, To what extent do you agree that the English vocabulary acquisition could be impacted by neuroplasticity?

The graph highlights a greater variability in the professionals' responses, English teachers **(S1)** with a 26,3% tie, they disagreed **(D)** and also strongly agreed **(SA)**, On the other hand, with a 33,3% tie, Psychopedagogues (**S2)**, although with fewer responses, tends towards neutrality and agreement. Besides this, S3 concurred with a 37,5% disagreement **(D)** in this statement. This could mean that even there is a small gap between the agreement and disagreement, the role of neuroplasticity on vocabulary acquisition is important.

This suggests a great contrast with the research of Puderbaugh and Emmady (2023), and Mateos-Aparicio & Rodríguez-Moreno (2019, p. 66), which states that neuroplasticity plays a pivotal role in the acquisition of a new language, in here the responses showed an alignment between the neutrality or uncertain **(U)** and the strongly agreement **(SA)**, not denying what the researcher said, but leaving the question open as the reason why the respondents had this tendency.

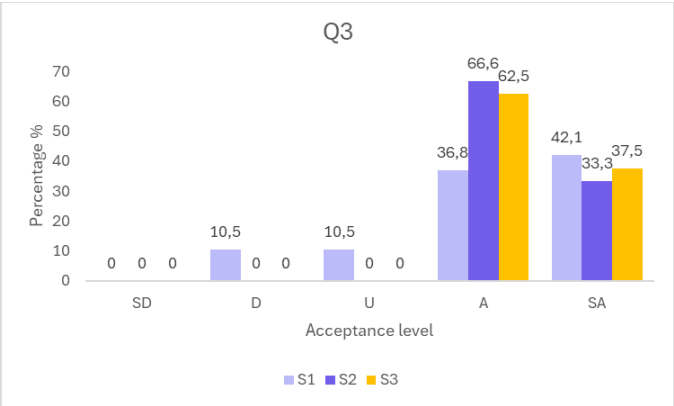
Figure 3. *Importance of the study of neuroplasticity in L2*



Note: Question 2, On a scale of 1 to 5, being 1 the minimum and 5 the maximum. Do you consider important to study the role of neuroplasticity in the acquisition of English as a second language?

In here, S2 and S3 had an intermediated high acceptance (U), (A) of the statement, as well as S1 with a minor difference of 2,2 (A) percent acceptance, these results left behind an interrogation, why are the S1 and S2 (U) with the statement? Skelly & Estrada (2023) mentioned that learning it is not a lineal process, and that neuroplasticity has a lot to do with the acquisition of a new language, this suggests that individual differences in learning strategies and cognitive flexibility may play a significant role in how effectively one can adapt to new linguistic structures.

Figure 4. *Use of neuroplasticity-based techniques in the acquisition of english vocabulary*

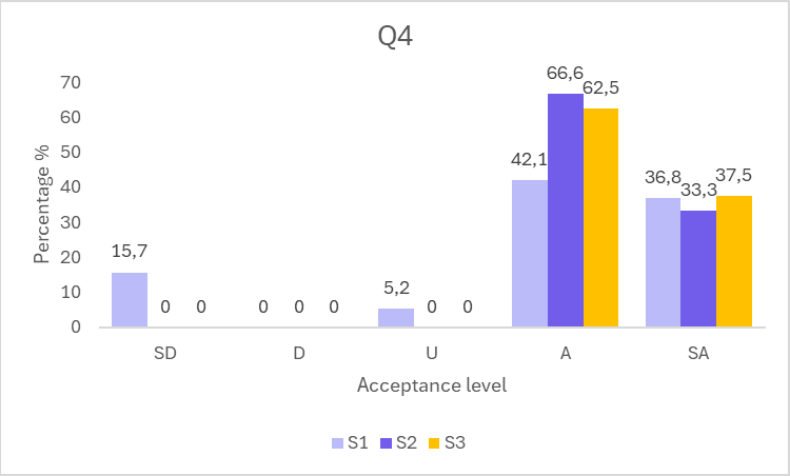


Note: Question 3, On a scale of 1 to 5, being 1 the minimum and 5 the maximum. Do you consider pivotal in the acquisition of English vocabulary the use of neuroplasticity-based techniques?

Indicating a very high acceptance among professionals in this category in (A) and (SA), this result emphasizes the acceptance of neuroplasticity-based techniques, supporting the use of this system (Wei et al., 2023) mentioned that studies had shown a significant impact in the white matter connectivity with language networks during L2 learning, suggesting an important technique to implement in the English teaching methodology. In addition to this, it brings the possibility to make another research or a proposal to propose training for English teachers in this valuable teaching technique.

Second domain 'Mindfulness', in this domain were applied three questions based on the second specific objective which is to identify the relationship between neuroplasticity and mindfulness techniques in the acquisition of English vocabulary.

Figure 5. *Mindfulness interventions in class*



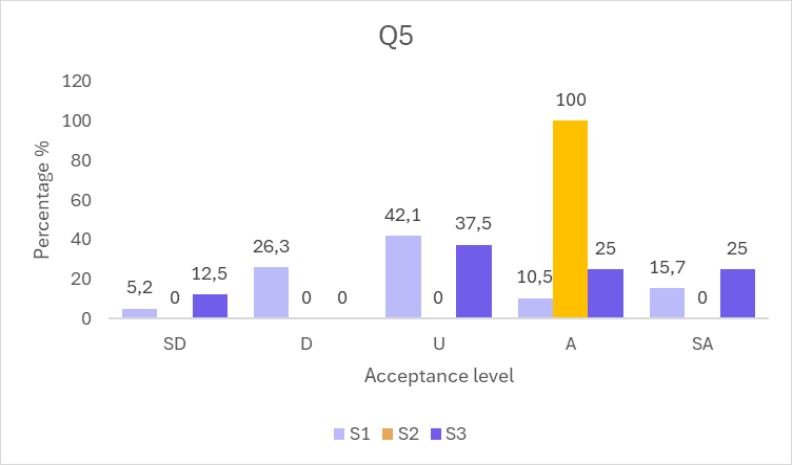
Note: Question 4, On a scale of 1 to 5, being 1 the minimum and 5 the maximum. How effective do you believe mindfulness interventions in a class could be beneficial in the acquisition of English vocabulary?

The graph highlights the high acceptance by the professionals surveyed of the proposal, with 42,1% (A) by S1, 66,6% (A) S2, and 62,5 (A) S3, it suggests the acceptance of this useful technique in the teaching process, this result is aligned with the research of Chareonsukmongkol (2019) about the use of mindfulness in the process of students evaluations, joining this as a useful tool to increase the brain plasticity, thus giving way to the next question.

This results in contrast with Saputri (2024) statement, which mentioned mindfulness-based strategies, such as mindfulness-enhanced writing instruction, significantly improving students'

writing abilities by fostering self-awareness and creativity. This leads us to explore how these strategies can be integrated into existing teaching methods to maximize their effectiveness and enhance overall student engagement.

Figure 6. *Mindfulness techniques in class*



Note: Question 5, Do you use mindfulness techniques in your class?

In this question, although the respondents considered the importance of this technique, the percentages decreased in the application of this technique, showing a neutrality with a small percentage agreeing that they use this technique in class, Just S2 professionals with a 100% were (A). This shows two factors that could be fundamental in this question, which are: the low level of knowledge of the technique and its half-hearted use, or no knowledge of the technique but with a tendency to know about it because of what they have heard from peers or professional development sessions. This indicates a potential area for growth, where further training and resources could enhance the understanding and implementation of mindfulness in educational settings.

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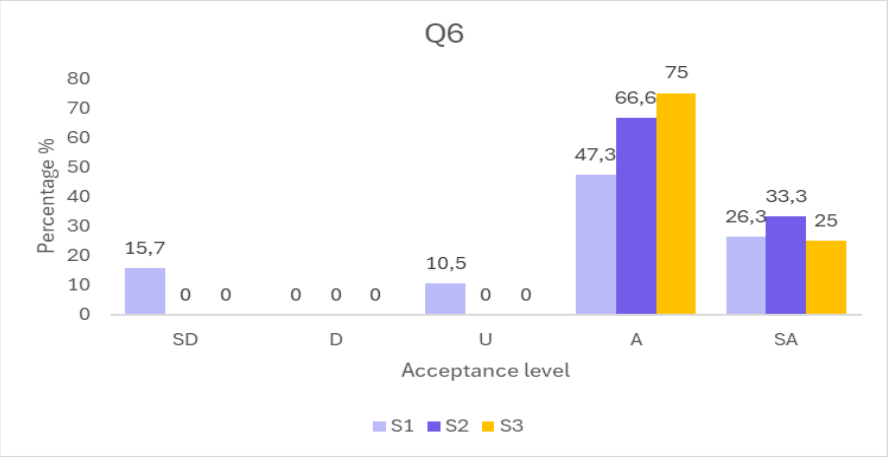
***Figure 7**. Incorporation of mindfulness in class*



Note: Question 6, Based on your experience. Do you think that it is important to incorporate mindfulness in classes?

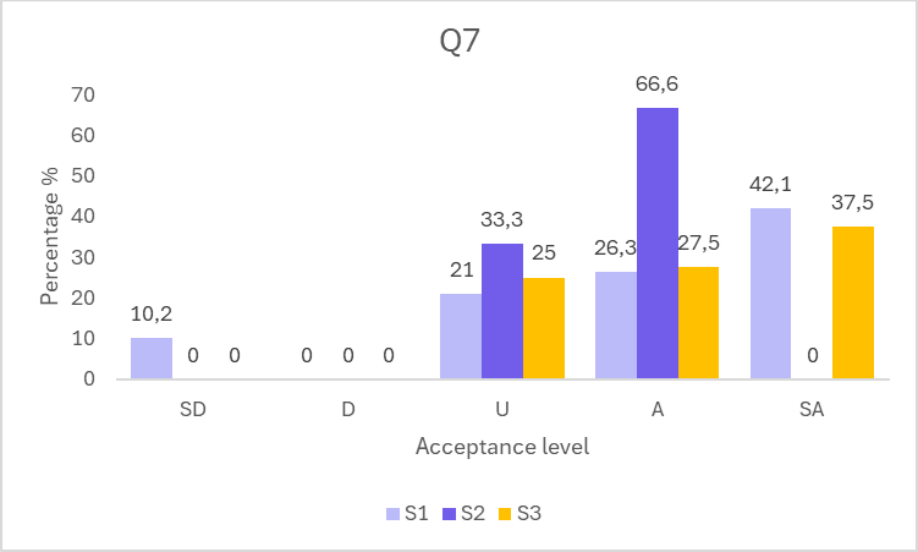
In this part, the graph shows a high concentration in (A), and (SA), almost 80% of the professionals indicated the acceptance of the statement.

Indeed, mindfulness meditation has been shown to enhance learners' motivation, confidence, and enjoyment in English learning, while also helping teachers manage stress and improve classroom dynamics (Zhao, 2024). Mindfulness-Enhanced Language Teaching (MELT) framework further supports this integration, promoting emotional regulation and cognitive skills among learners (Gönen, 2024).

This suggests a growing recognition of the benefits that mindfulness practices can bring to both students and educators, fostering a more positive and productive learning environment.

Third domain 'Neuroplasticity', in this domain were applied the last three questions based on the third specific objective which is to determine if it is important to use neuroplasticity-based techniques in English classes.

Figure 8. *Neuroplasticity principles in teaching methods*

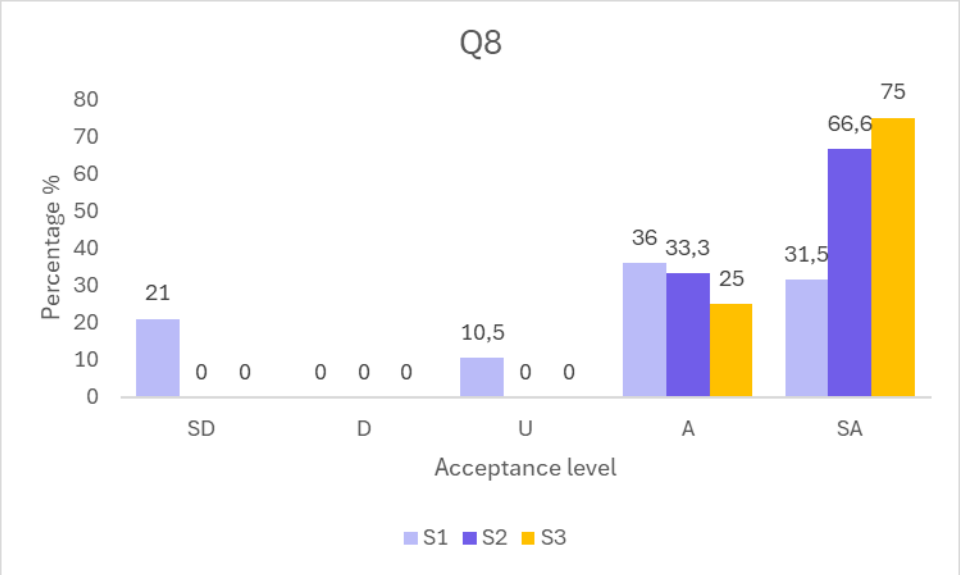


Note: Question 7, How often do you incorporate neuroplasticity principles into your teaching methods for English vocabulary acquisition?

The graph shows a marked tendency towards (A) and (SA) for S1 and S2, S3 on the other hand goes from (U) to (SA), in this question the professionals were given a choice of options being (SD) never, (D) rarely, (U) sometimes, (A) usually and (SA) always. Therefore, from the results it can be inferred that the professionals incorporate the use of the principles of neuroplasticity to different extents.

Which highlights the need for greater knowledge of this useful tool within English language teaching, in order to achieve teaching that can meet the abilities of each learner, whether it be comprehension and grammatical study or individual skills. This could contribute to the stimulation of the limbic system which is in charge of the different process of learning and behavior (Baev, 1998), hierarchical levels within the limbic system contribute to learning by processing various afferent signals.

Figure 9. *Influence of the age in the effectiveness of neuroplasticity*



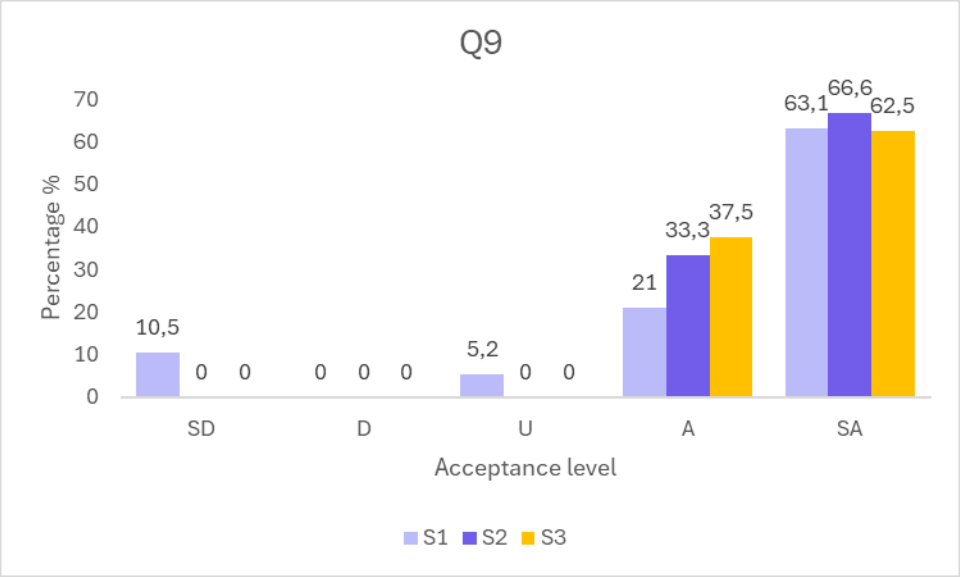
Note: Question 8, To what extent do you agree that age influences the effectiveness of neuroplasticity in learning English vocabulary?

According to the respondents' answers, the graph shows a high tendency towards (A) and (SA), thus adding up to more than 80% unanimity on the question.

This contrasts with what Medina (2023) emphasized, that it is essential to recognize that age and prior linguistic experience can make changes in our brain thought neuroplasticity, highlighting the complexity of language learning processes.

Therefore, based on this result, practitioners underline the importance of taking into account the age at which neuroplasticity-based techniques are applied. This suggests that tailored approaches may be necessary to optimize learning outcomes across different age groups, ensuring that methods align with the cognitive and developmental stages of learners.

Figure 10. *Effectiveness of neuroplasticity-based interventions*



Note: Question 9, On a scale of 1 to 5, being 1 the minimum and 5 the maximum. How effective do you believe neuroplasticity-based interventions could be enhancing English vocabulary acquisition among second language learners?

The graph shows an acceptance rate of over 85%, thus leaning towards (A) and (SA), demonstrating that practitioners consider the use of neuroplasticity-based techniques for English language acquisition to be effective. This result indicates that the importance of this technique could be beneficial in the English teaching area, providing the opportunity to create new techniques to teach.

As Wang et al. (2020) mentioned that studies showed correlations between L2 proficiency and neural changes in specific brain regions, this highlights the importance of cognitive flexibility and language control in bilingualism, which means that the input of new strategies based on neuroplasticity intervention could report high benefits among the English learners.

Discussion

The findings from the survey conducted among professionals in English teaching, Psychopedagogy, and English teachers with a master's degree in Psychopedagogy provide valuable insights into the relationship between neuroplasticity, mindfulness, and English vocabulary acquisition. The results indicate a significant interest in understanding and applying

neuroplasticity-based techniques in language learning, yet they also reveal a variety of opinions regarding their effectiveness and the role of age and mindfulness in this process.

The responses regarding the impact of neuroplasticity on English vocabulary acquisition highlight a divide among the professionals surveyed. While a portion of 49% of the participants expressed strong agreement that neuroplasticity significantly impacts vocabulary acquisition, the other 51% demonstrated uncertainty or disagreement. This variability suggests a need for further research with a Qualitative approach to go deeper in the professional.

The inquiry into the necessity of studying neuroplasticity's role in second language acquisition produced a moderate consensus, particularly among professionals with Psychopedagogical backgrounds. However, the neutral posture of some English teaching professionals suggests that maybe they are not used to use neuroplasticity principles as strategies in English class.

When examining the role of mindfulness techniques, the results revealed a notable acceptance of their effectiveness in enhancing English vocabulary acquisition. Many respondents acknowledged the positive influence of mindfulness practices on student engagement and cognitive flexibility. However, the discrepancy between the high acceptance of mindfulness's importance with a 90% and the lower reported application of these techniques with a 73% in classrooms indicates a critical area for development. It suggests that while educators recognize the potential benefits, they may lack the necessary training or resources to implement mindfulness strategies effectively.

The survey also explored the relationship between age and the effectiveness of neuroplasticity in learning English vocabulary. With an 89,5% the strong consensus indicating that age plays a crucial role in neuroplasticity's effectiveness aligns with Medina (2023), that highlights the varying impacts of age and prior linguistic experience on language acquisition. This finding emphasizes the necessity for tailored approaches that consider the cognitive and developmental stages of learners, ensuring that neuroplasticity-based techniques are applied appropriately across different age groups.

Finally, the overall acceptance of neuroplasticity-based interventions for enhancing English vocabulary acquisition indicates a promising path for future research and practice. The high percentage of respondents with 85% who believe in the effectiveness of these techniques suggests a readiness within the educational community to explore innovative methodologies that leverage the brain's adaptive capabilities. As studies continue to demonstrate the correlation between second language proficiency and neuroplastic changes in the brain (Wang et al., 2020).

To sum up, despite the limitations which were external factors such us time and power outages, the results of this survey provided a new perspective associated with the impact that the incorporation of neuroplasticity and mindfulness in English vocabulary acquisition have.

Conclusion

The results from the study addressed the research question which was: What is the impact of neuroplasticity on English vocabulary acquisition? And the general objective which was to determine if neuroplasticity has an impact in the acquisition of English vocabulary as a second language.

According to the results obtained from the population surveyed, at list the 49% expressed the agreement on the impact of neuroplasticity in the acquisition of English vocabulary which make a different point of view from the beginning of the research, in which was mentioned that neuroplasticity has an impact in the acquisition of a new language, which is valid and brings the possibility for a further research.

However, in the first specific objective: to study the role of neuroplasticity in the acquisition of English vocabulary as a second language. The percentage was 85%, which aligns with Kolb's learning cycle (Saul McLeod, 2022) in which the use of neuroplasticity based techniques could be part from the observation and analysis of the new stimulus to the execution and internalization of the same to define and create a new memory of what has been learned.

In addition to this, the investigation into the specific roles of neuroplasticity and aligned with the second specific objective about the importance of mindfulness strategies in English vocabulary, has demonstrated a moderate consensus among educators on the importance of these concepts in second language acquisition. It was demonstrated that even though the professionals did not use mindfulness techniques in class, they consider the use of it important.

Accomplishing the last specific objective with a 90% of agreement according to the professionals who participated in this research, which was if it is important to use neuroplasticity-based techniques in English classes, giving as a result the insight that this technique could be develop as an effective strategy to teach English vocabulary.

Moreover, the findings highlight the importance of considering age as a significant factor in the effectiveness of neuroplasticity in language learning. The strong consensus among respondents advocates for tailored approaches that provide to the cognitive and developmental stages of

learners, ensuring the optimal application of neuroplasticity-based strategies across diverse age groups.

Finally, based on the analysis of each of the data obtained, it can be established that although the reason why the group of respondents tended to be uncertain or disagreed about the research question is unknown, there was a great acceptance of the topic in general, highlighting the strategies of neuroplasticity and mindfulness. The experts suggested that, to gain a deeper understanding of the topic, the study could be conducted with a qualitative approach where the opinions of the professionals would be investigated deeply.

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