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BRIDGING BRAIN AND LANGUAGE: POSTGRADUATE STUDENTS' PERCEPTIONS NEUROEDUCATION IN ENGLISH LANGUAGE TEACHING

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ABSTRACT

This study aims to explore postgraduate students' perceptions of the importance of Neuroeducation in English Language Teaching (ELT) and their awareness of its application. A mixed-methods approach was employed in this study. The study involved 30 postgraduate students from Master of Education programs at various universities. Questionnaires were used to collect quantitative data, while open-ended interviews were conducted to gather qualitative data. The data were analyzed using descriptive statistics for the quantitative data and thematic analysis for the qualitative data. The findings reveal that postgraduate students perceive understanding brain function as crucial in ELT. Regarding the awareness of Neuroeducation, participants highlighted the significance of accessible neuroscience resources, with the highest mean score (M = 4.87) for the need to make neuroscience information easily available to educators. The study concludes that postgraduate students recognize the importance of Neuroeducation in creating personalized and inclusive learning environments, though challenges remain, such as the need for formal training. Thus, Neuroeducation is considered an interdisciplinary field that can bring insights into how the brain learns the knowlegde into more effective and inclusive teaching stratgies, particularly in English language teaching.

Keywords: ELT, Neuroeducation, Perception

A. INTRODUCTION

Neuroeducation is an interdisciplinary field that bridges neuroscience and education, focusing on how the brain learns and how this understanding can enhance teaching and learning processes (Bhargava & Ramadas, 2022). Previous study stated, the human brain has an incredible capacity to adapt and build new connections through the learning process (Sousa, 2023). By examining the neural mechanisms involved in language comprehension and production, Neuroeducation offers valuable insights for language teaching, especially in English. These insights enable educators to develop more effective, brain-compatible teaching strategies that align with the natural processes of language acquisition (Fragkaki et

al., 2022) and can improve teaching methods (Kuhl, 2011). Additionally, the emerging interdisciplinary field of Neuroeducation has significant potential and is worth pursuing, particularly for its applications in language teaching (Serpati & Loughan, 2012).

Traditional language teaching often relies on linguistic theories that emphasize grammar, vocabulary, and structure. However, these approaches may not fully align with how the brain naturally processes language. Neuroscience-based methods suggest that focusing on meaningful communication and authentic language use can enhance language acquisition. Additionally, Neuroeducation programs focus on functional exercises, emphasizing the body as the direct expression of emotions and the bridge between perception and action (Jorio, 2020). A recent review has identified seven fundamental teaching principles based on neuroscience for application in higher education: (i) students' attention span, (ii) dual coding, (iii) chunking of content, (iv) teaching with emotions, (v) creativity, (vi) critical thinking, and (vii) consolidation and retrieval (Fragkaki et al., 2022). As the field develops, there is a growing need to explore how these neuroeducation principles are studied and applied by educators in English teaching.

Additionally, Neuroeducation itself supports inclusive education, which aims to provide the widest possible opportunity to obtain a quality education that suits the needs and abilities of all students with physical, mental, emotional, and social disabilities (Agustina & Rahaju, 2021). Neuroeducation also helps educators find a way for English language learners to face the challenges of understanding complex text-based information due to language barriers. By incorporating visual content, educators can provide a visual representation of concepts, making it easier for these learners to comprehend and engage with the material (Sahiti & Stamp, 2022). This is an attitude change in developing teacher self-efficacy (Luzzatto & Rusu, 2019). This insight about Neuroeducation can be a way to reduce bad knowledge about brain science related to education and avoid misinterpretation of knowledge among educators, especially English teachers as second language teachers (Simoes et al., 2022).

1. Neuroeducation in ELT

Integrating neuroeducation benefits both researchers and educators, as it opens up opportunities for a deeper understanding of the functions and strategies in teaching. High enthusiasm for integrating neuroscience and education is demonstrated by educators who have heard of and used various brain-based initiatives in education on teaching and learning approaches, learning styles, educational kinesiology, and research-based ideas in cognition and neuroscience (Pickering & Howard-Jones, 2007). Neuroeducation is a science that combines neuro-science, psychology, and education to provide insight how the brain learns, bridging the gap between theory and practice in teaching, especially English language teaching. There must be a two-way and reciprocal interaction between the two disciplines of neuroscience and education (Ansari et al., 2012). This interdisciplinary approach also emphasizes understanding the neural mechanism underlying the learning process to create effective and efficient educational settingg (Zadina, 2014). Understanding the neurological underpinnings of learning, cognition, and behavior is critical to examining the effectiveness of various professional development formats in graduate students and teachers.

This can bridge neuroscience research and language teaching (Serpati & Loughan, 2012). The process of building self-evaluation allowed teachers to reflect on their professionalism and analyze their actions in Neuroeducation (Compagno & Pedone, 2016). The study found that academics recognized the importance of neuroeducation training and the need to deepen

their understanding of memory function to enhance students' knowledge retention (Fragkaki et al., 2022). However, despite the advantages of integrating Neuroeducation, some gaps must be bridged to remain sustainable. The study proposes a new metaphor of a "common field to be developed" to bridge the gap between cognitive neuroscience and education, emphasizing the need for concrete action and collaboration between scholars from both disciplines (Basso & Cottini, 2023). This common field can be developed in the language because the teachers should stimulate motivation, attention, emotions, and memory to help their students process and learn the language (Madua, 2022). In global, neuroeducation is gaining interest, with research demonstrating its efficacy across educational systems (Immordino-Yang, 2016) so the current study is an attempt to find out the views of postgraduate students towards Neuroeducation in English language teaching.

2. Postgraduate Students Insights on Neuroeducation

Postgraduate students, as future educators and researchers play an important and a critical role in integrating neuroeducational principles into teaching practices. Their advanced academic backgrounds make them to evaluate and implement brain based teaching methods in diverse educational setting (Immordino-Yang, 2016). With their critical role and background, graduate students will bring innovative perspectives to the field of education, especially language education, to create engaging and active learning environments (Sousa, 2023) so that they can adopt evidence-based strategies in their classrooms (Howard-Jones, 2014). By understanding how cognitive and emotional processes influence language learning, these future educators can personalize instruction to optimize student learning outcomes while addressing the challenges of diverse classrooms (Neuman & Roskos, 2012).

Perceptions of neuroeducation among postgraduate students are integral to the application in brain-based teaching methodologies. The view of neuroducation allowing for personalized instruction to meet the need of individual learners (Jensen, 2018). However, the limited exposure to neuroscience in education currricula may hinder ts widespread adoption. Awareness of neuroeducational concepts remains uneven among educators and postgraduate students, necessitating the integration of neuroducational principles into teacher preparation programs to develop their professionalism. While Neuroeducation has been explored in general education, little is know about reception and awareness of neuroeducation in English language teaching. Most previous studies have focused on applying neuroscience context to the creation od teaching practices in general rather that explicitly adressing the viewpoints of students studying to become English language teachers (Zadina, 2014; Sousa, 2017). Challenges such as neuroeducational myths and lack of neuroscience literacy among educators are often barriers to effective implementation (Le Cunff et al., 2024). The existing literature emphasizes the benefits of neuroeducation for student learning, such as its effects on knowledge retention and classroom motivation (Immordino-Yang, 2016). Previous study highlighted the importance of improving neuroscience literacy to help educators understand the brain mechanisms underlying cognitive and emotional functions (Jolles & Jolles, 2021). However, it needs to discuss how preservice teachers perceive the concept's relevance and applicability.

Postgraduate students, as advanced learners and future educators, play a vital role in exploring and applying Neuroeducation principles. Their perceptions can provide valuable insights into how neuroscience-informed strategies can be integrated into English Language Teaching (Maros et al., 2012). The lack of emphasis on the integration of neuroeducation into teacher education programs, particularly in the context of language learning. Previous

study has demonstrated the importance of a cross-disciplinary approach to improving teaching effectiveness (Jensen, 2008). There is no study has explicitly investigated how postgraduate students conceptualize and implement neuroeducation in curriculum design, special needs assessment, and inclusive learning environment. Thus, this study seeks to bridge it by investigating postgraduate students' perspectives and awareness of neuroeducation, specifically in the context of teaching English as a second language. Based on the background described, the focus of the research is as follows:

1. How do Postgraduate students perceive the important of Neuroeducation in English language teaching?
2. What is the awareness of Neuroeducation in English language teaching among postgraduate students?

B. METHOD

The study employed a mixed-methods approach to examine postgraduate students' perceptions of the importance of Neuroeducation in English Language Teaching (ELT) and their awareness of its application. This approach combined both quantitative and qualitative data collection methods. The study involved 30 postgraduate students from Master of Education (M.Ed.) programs at various universities. Participants completed an online questionnaire (n = 30), and a subset of three students participated in in-depth interviews. A snowball sampling technique was employed, wherein participants were invited through their colleagues, who shared the survey link with others. Participants' ages ranged from <25 years (53%), 25–35 years (40%), and 36–45 years (7%). Most participants had 1–5 years of teaching experience (70%), with 20% having less than one year and 10% more than five years. Regarding educational background, 70% held a bachelor's degree in education, while others had degrees in humanities (3%) or literature.

Data were collected using a questionnaire consisting of 16 items: three demographic questions, 13 Likert-scale items adapted from Pickering and Howard-Jones (2007), and three open-ended questions from Serpati & Loughan (2012). The Likert-scale items assessed participants' perceived importance of Neuroeducation in English Language Teaching (ELT) where the items focused on understanding the brain to indicate the extent to which the participants understand about the importance of brain function and application of neuroscience to English language teaching on a scale from 1 (unimportant) to 5 (very important). The open-ended interview questions were designed to explore key aspects of the study, including the workplace applications of neuroscience, its perceived relevance to English Language Teaching (ELT), and its potential contributions to teaching practices. The interview questions are as follows:

1. Has your workplace used teaching or learning techniques based on ideas about the brain? If so, have you found them to be useful?
2. Do you think neuroscience should be contributing to English language teaching practice? If so, what do you think are the most important questions brain researchers should ask to help inform your English language teaching practice?
3. In general, how do you feel about the potential of neuroscience in informing English language teaching?

Descriptive statistics were used to analyze quantitative data, summarizing participants' perceptions of Neuroeducation. In-depth interviews were qualitatively analyzed using thematic analysis to identify key insights into the perceived importance and practical applications of Neuroeducation in ELT. The findings from both data sources were triangulated to enhance reliability

C. FINDINGS AND DISCUSSION

1. Postgraduate Students' Perception of The Importance of Neuroeducation in ELT

The study asked the participants if they thought understanding the brain was important in teaching English. The answer to this question was resoundingly positive (tabel 1).

Table 1. Level of Importance Rated by Postgraduate Students

	Important (%)	Unimportant (%)
Understanding of the brain		
The design of English educational programs	100	
The delivery of English educational programs (i.e., teaching)	93	7
Early screening for learning problems	90	10
Decisions about English curriculum content	80	20
Provision for individuals with special educational needs of a cognitive nature	100	
Provision for individuals with special educational needs of a physical and sensory nature	90	10
Provision for individuals with special educational needs of a behavioral and emotional nature	97	3
An understanding of the role of nutrition in educational achievement	73	27
Application of neuroscience and English language teaching		
A two-way dialogue between educators and neuroscientists	90	10
Relevance to the ‘‘real’’ classroom	93	7
Avoiding the misinterpretation of science	93	7
Information is easily accessible to teachers and other educational practitioners	97	3
Ethical issues in brain research	93	7

The importance of understanding brain function in various aspects of English language teaching according to postgraduate students. Specifically, 100% of respondents identified that understanding brain function is very important in designing English language education programs and adressing the cognitive needs of students with disabilities. The results supported by a participant statements showed that *"Teachers need to understand brain function and use suited teaching techniques tairlored to students' conditions"*, reflecting participantss' views on the importance of neuroeducation in adressing students' distinct requirements. High levels of agreement were also seen in the delivery of educational programs (93%) an the identification of emotional and behavioral needs (97%). However, the role of brain function in curriculum decisions (80%) and the importance of nutrition in educational achievement (73%) received relatively lower ratings. These findings suggest that while participants recognized the values of neuroscience in ELT, specific areas, such as curriculum decisions and the role of nutrition, may require further awareness and emphasis.

The most perception of participants about the application of neuroscience in ELT considered issues such as establishing a two-way dialogue between educators and neuroscientist (90%) and ensuring ethical considerations in brain research (93%) to be very important. Similarly, accessibility of neuroscience information to teachers was considered very important by 97% of respondents. This pattern of responses indicates strong support for integrating neuroscience into ELT practice, with a particular emphasis on practical and ethical applications that align with classroom realities.

Table 2. Understanding of the brain

	Mean	Std. Deviation
The design of English educational programs	5.00	.000
The delivery of English educational programs (i.e., teaching)	4.73	1.015
Early screening for learning problems	4.60	1.221
Decisions about English curriculum content	4.20	1.627
Provision for individuals with special educational needs of a cognitive nature	5.00	.000
Provision for individuals with special educational needs of a physical and sensory nature	4.60	1.221
Provision for individuals with special educational needs of a behavioral and emotional nature	4.87	.730
An understanding of the role of nutrition in educational achievement	3.93	1.799
Total	36.93	4.891

The indicator in Table 2 about understanding the brain in English language teaching showed that the highest mean scores (M = 5.00, SD = 0.000) were recorded for two aspects: designing English language education programs and providing special educational needs for individuals with cognitive needs. A participant's statement supported this finding, *"The relevance to the real classroom is crucial because it allows teachers to make practical adjustments and create engaging learning environments".* This reflects the full agreement among the participants regarding the crucial role of neuroeducation in the field. High mean scores were also seen in providing special educational needs for individuals wirh behavioral and emotional needs (M = 4.87, SD = 0.730) and delivering English language education programs (M = 4.73, SD = 1.015), which underscores the importance of neuroscience in practical and instructional contexts. This also reflected in the statement, *"A collaboration between educators and neuroscientist helps us better understand students' learning styles and how to tailor the methods accordingly."*

Participants also highlighted the benefits of neuroeducation in understanding students' learning styles, as explained by a participant, "To identify students' learning styles and abilities, usually detected by their brain's cognitive aspect, and decide teaching methods based on students' needs and abilities. Thus, early screening is important for learning problems and providing special educational needs for individual with physical and sensory needs (M = 4.60, SD = 1.221). These findings indicate recognition of the role of neuroscience in identifying and addressing diverse learning needs. However, the lowest mean score (M = 3.93, SD = 1.779) was reported for understanding the role of nutrition in educational achievement. This suggest that while participants value neuroeducation, the relationship

between nutrition and academic performance may need to be more appreciated or fully understood. The total mean score (M = 36.93, SD = 4.891) refelcts an overall positive perception of the importance of understanding brain function in ELT. These results emphasize the need to integrate neuroscience concepts into teacher training programs, particulary in areas such as curriculum design and inclusive education, while highlighting the need to raise awareness of factors such as the role of nutrition in learning.

The results indicated that postgraduate students have a strong positive perspective of the importance of neuroeducation in English language teaching. The quantitative data in Table 1 showed that 100% of respondents consider understanding brain function to be very important in designing English language education programs and addressing the cognitive needs of students with special needs. The statement of a participant supported this, *"Teachers need to understand brain function and use suited teaching techniques tailored to students' conditions."* This findings are consistent with previous research by Zadina (2014), which stated that neuroeducation bridges the gap between theory and practice through understanding the neural mechanisms underlying the learning process.

The positive perception is also reflected in the high score of the aspects of educational program (93%) and identification of students' behavioral and emotional needs (97%). This underscores the importance of neuroscience in supporting more personalized and inclusive learning needs. As one participant explained, *"To identify students' learning styles and abilities, usually detected by their brain's cognitive aspect, and decide teaching methods based on students' needs and abilities."* This view reflected the findings of Jensen (2018), who highlighted the importance of a brain-based approach in creating personalized instruction to meet the individual needs of students. However, the challenges remain, particularly in increasing knowledge related to nutrition and curriculum decision-making, which showed lower mean scores of 3.93 and 4.20, respectively. This suggested that certain aspects of neuroeducation, such as the relationship between nutrition and academic performance, require greater emphasis, as suggested by Immordino-Yang (2016), that effective implementation requires a holistic understanding of the factors that influence learning.

2. Awareness of Neuroeducation among Postgraduate Students

The following table presents the postgraduate students' awareness of Neuroeducation in English Language Teaching (ELT).

Table 3. Application of neuroscience and English language teaching

	Mean	Std. Deviation
A two-way dialogue between educators and neuroscientists	4.60	1.221
Relevance to the ‘‘real’’ classroom	4.73	1.015
Avoiding the misinterpretation of science	4.73	1.015
Information is easily accessible to teachers and other educational practitioners	4.87	0.730
Ethical issues in brain research	4.73	1.015
Total	23.67	3.977

Data in Table 3 provide insight into postgraduate students' perceptions regarding the application of neuroscience in English language teaching. The results showed that accessibility of information for teachers and other educational practitioners had highest mean score (M = 4.87, SD = 0.730), reflecting the recognition of the importance of providing easily accessible neuroscience-based information to support teaching practice. Other high mean scores were seen in the items relevance to real classroom situations (M = 4.73, SD = 1.015) and avoiding misinterpretation of science (M = 4.73, SD = 1.015), indicated that posgraduate students values the importance of relevant and accurate implementation of neuroscience in the classroom context. The indicator of two-way dialogue between educators and neuroscientist was also rated as important (M= 4.60, SD = 1.221), it highlighted the need for close collaboration to ensure the effective application of neuroscience. The total mean (M = 23.67, SD = 3.997) indicated a positive view towards the application of neuroscience in ELT. The findings showed that necessity of delivering precise, pertinent, and accessible neuroscience-based material to assist educators in embedding neuroscience principles into their teaching practices.

Three response questions of in-depth interview questions, all participants gave positive answers. First, the students agree that NeuroEducation is very useful and has worthy potential to be developed in English language teaching. However, on the second question, all participants had their answers: *"How can neuroscience be implemented in students (normal)?" "how to make the learning environment to understand students' emotional, understanding, social, and etc?", "how to stimulate the brain or what kind of learning teaching method can help students easily acquire new vocab or new language applied?".* In the last question, all students said that Neuroeducation has great potential to contribute to English language teaching by providing insight and teaching methods that will be informed by neuroscience as the main support for English language teaching.

The data in Table 3 showed that accessibility of neuroscience information to educators had the highest mean score (M = 4.87), reflecting the need for easily accessible neuroscience resources to support teaching practices. As one participant explained, *"The relevance to the 'real' classroom is crucial because it allows teachers to make practical adjustments and create engaging learning environments."* This findings are consistent with previous research by Pickering and Howard-Jones (2007), who highlighted the importance of providing neuroscience-based information that can be directly applied in the classroom.

Participants also emphasized the need for closer collaboration between educators and neuroscientists, as stated, *"A collaboration between educators and neuroscientists helps us better understand students' learning styles and how to tailor the methods accordingly."* This statement supports Basso and Cottini's (2023) recommendation to create a "common field" that integrates neuroscience research and educational practice through cross-disciplinary collaboration. However, the lack of formal training remains a barrier; as one participant noted, *"The teachers may need workshops and training to understand brain-based teaching practices and implement them effectively."* Fragkaki et al. (2022) also noted that professional development programs that emphasize memory function and learning efficiency are important steps to increasing the implementation of neuroeducation.

Finally, research suggested that neuroeducation is gaining interest due to its benefits in creating effective learning environments (Immordino-Yang, 2016). These findings underscored the importance of introducing neuroscience concepts into teacher education

programs to increase postgraduate students' awareness and professionalism. With measures such as workshops, training, and multidisciplinary collaboration, neuroscience-based teaching can become more relevant, effective, and inclusive. This findings are consistent with previous research by Madua (2022) that neuroeducation can help educators stimulate students' motivation, attention, emotions, and memory to maximize English learning.

D. CONCLUSION

This study assessed postgraduate students' perceptions of Neuroeducation in English language teaching. The questionnaire and interview questions were selected from a literature review based on research questions that address understanding the brain and its application to English language teaching. Based on the data collected through this study, postgraduate students attach great importance to understanding Neuroeducation in English language teaching. Thus, Neuroeducation is considered an interdisciplinary field that can bring innovation to English language teaching. This study showed that postgraduate students have a very positive perception of the importance of neuroeducation in English language teaching. This findings are consistent with previous literature, which highlighted that understanding neural mechanisms can help educators create more personalized and evidence-based teaching strategies (Zadina, 2014; Jensen, 2018). Qualitative data also revealed that participants recognized the benefits of neuroeducation in helping teachers understand students' learning styles, choose appropriate teaching methods, and create inclusive learning environments. Participants suggested the need for formal workshops and training to improve teachers' understanding of neuroeducation, which is also supported by literature emphasizing the importance of professional development in this area (Fragkaki et al., 2022). However, aspects such as the role of nutrition in educational achievement received less attention, suggesting a gap in understanding that needs to be bridged by further research. However, the sample size of this study was limited to 30 postgraduate students from several universities, so the generalizability of the results may be limited. Future research could expand the sample size by involving participants from different cultural and academic backgrounds to test the validity of the findings. In addition, this study focused more on perceptions and awareness, while the practical implementation of neuroeducation in ELT requires more in-depth exploration. By addressing these limitations, further research could help bridge the gap between theory and practice, supporting the wider adoption of neuroeducation in English language teaching.

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