NEURODIDACTIC STRATEGIES IN THE PROFESSIONAL DEVELOPMENT OF PRE-SERVICE FOREIGN LANGUAGE EDUCATORS

ESTRATEGIAS NEURODIDÁCTICAS EN EL DESARROLLO PROFESIONAL DE LOS DOCENTES DE LENGUAS EXTRANJERAS EN FORMACIÓN

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ABSTRACT: The study addresses the limited pedagogical experience of pre service teachers in the final semesters of the Bachelor's Degree in Modern Languages with an emphasis in English (LLM-English) at Universidad La Gran Colombia (UGC), a gap they recognize as affecting their teaching practice. It begins with a comprehensive literature review and applies a mixed methods design with a qualitative emphasis. Initial data were gathered through surveys to understand the problem, followed by focus groups and observations using recordings and structured instruments. The findings strengthen academic understanding of neurodidactics in foreign language education and contribute to ongoing research in this field.

Keywords: English as foreign language; modern languages; neurodidactics; pedagogical experience; pre-service teachers.

RESUMEN: El estudio aborda la limitada experiencia pedagógica de los docentes en formación de los últimos semestres del programa de Licenciatura en Lenguas Modernas con énfasis en Inglés (LLM-Inglés) en la Universidad La Gran Colombia (UGC), una brecha que ellos mismos reconocen como un factor que afecta su práctica docente. La investigación inicia con una revisión exhaustiva de la literatura y aplica un diseño de métodos mixtos con énfasis cualitativo. Los datos iniciales se recopilaron mediante encuestas para comprender el problema; posteriormente se realizaron grupos focales y observaciones utilizando grabaciones e instrumentos estructurados. Los hallazgos fortalecen la comprensión académica de la neurodidáctica en la educación de lenguas extranjeras y contribuyen a la investigación en curso en este campo.

Palabras clave: inglés como lengua extranjera; lenguas modernas; neurodidáctica; experiencia pedagógica; docentes en formación.

INTRODUCTION

In the LLM-English program at UGC in Bogotá, Colombia, teaching practice takes place during the final academic cycle. Consequently, students who wish to begin teaching before completing their degree lack the strategies and pedagogical experience necessary for their professional initiation. It has been observed that pre-service teachers do not fully recognize the importance of teaching strategies, a fact they openly express both inside and outside the classroom. This lack of awareness likely affects their performance during teaching practice.

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Furthermore, when faced with challenges during their practice such as time management, working conditions, students' attitude and behaviors, many pre-service teachers reconsider their career choice and decide to leave the teaching profession. This shift can lead to diminish passion for teaching and a reduction in the number of dedicated modern language professionals in the community.

Also, current teaching strategies are often viewed as traditional and repetitive, which is why it was intended to work from neurodidactics, since it is a branch of pedagogy that relies on the functioning of the brain to design more efficient teaching strategies and methodologies, obtaining innovative learning.

In that order of ideas, the general objective of the research is to provide teaching strategies from neurodidactics for pre-service teachers who study in the last semesters in the LLM-English at UGC. All of this leads to the central research question: What neurodidactic teaching strategies can support pre-service teachers in the LLM-English program at UGC?

To achieve the general objective, first, it was essential to characterize the population of pre-service teachers undergoing pedagogical initiation, as various classification variables were identified that allowed for greater precision in analyzing the findings. By determining the needs of this population in their teaching practice, it became possible to implement and analyze in detail the key factors that contribute to the successful development of teaching strategies.

This research is justified by its contribution to the development and implementation of teaching strategies grounded in neurodidactics, a field that integrates neuroscience with educational practices to enhance learning outcomes. By aligning these strategies with the specific needs identified among pre-service teachers in the process of pedagogical initiation, the study promotes a more empathetic and community-based construction of knowledge. This approach not only fosters more meaningful and inclusive learning environments but also supports the design of methodologies that are both relevant and effective in contemporary educational contexts.

Moreover, the research goes beyond addressing specific academic concerns. It actively involves participating teachers in the investigative process, transforming them into co-constructors of knowledge. This participatory dimension enriches their professional development and generates valuable insights for the broader academic community. In doing so, the study contributes to the advancement of neurodidactic practices while reinforcing the collaborative and reflective nature of teacher education.

LITERATURE REVIEW

In this section a theoretical discussion about the main constructs for the project related to neurodidactic strategies to help pre-service teachers in the LLM-English at UGC, the constructs to be discussed are Neurodidactic Strategies, Neurodidactics in Foreign Languages, Effective Teaching strategies, and Pre-service Teachers' Strategies. The authors' main arguments, discussions and conclusions offered valuable insights into the strategies proposed to support pre-service teachers in their pedagogical practices, aiming to enhance both the effectiveness of their teaching and their passion for the

profession.

NEURODIDACTIC STRATEGIES

They are considered as the didactic elements that can be used in the classroom based on the understanding of brain structures, neuronal connections, and brain functioning with the purpose of applying activities in the classroom to foster motivation, creativity and long-lasting connections in the learning processes of the students.

To begin with, it is important to highlight the significance of understanding brain structures and neural connections in order to enhance motivation, memory, and information processing, as emphasized in the study by Carillo & Zambrano (2021). In fact, educators need to recognize how the brain functions and characteristics to effectively motivate students, foster creativity, and promote long-lasting learning experiences. The aforementioned study, conducted in a basic education school in Ecuador using a mixed-methods approach, aimed to identify the neurodidactic strategies employed by teachers. The results demonstrated that these strategies encouraged the use of active and interactive methodologies, which not only supported students' learning processes but also enriched teachers' pedagogical practices.

Additionally, Ramos, A. & San Andrés, E (2019) determined the relation between neurodidactics and emotional competences showing that the first can positively affect the second one by means of a quantitative study in Ecuador with 45 students under 6 to 8 years by means of an experimental method. The authors describe the emotional competences analyzed and showed an increase in the relation between neurodidactics and the emotional competence which influences learning in the population. Consequently, the management of the neurodidactics in pedagogy serves as a useful tool to foster motivation, self-regulation, assertiveness, and creativity in learning.

NEURODIDACTICS IN FOREIGN LANGUAGES

The concept of neurodidactics has been lately applied in foreign languages. It is the result of the connection between neuroscience, pedagogy, philosophy among other disciplines to engage the learning community in the inclusion of knowledge about the brain to apply successful strategies to enhance motivation, creativity, empathy, etc. in the foreign language classrooms.

Abdufattoyevna (2021) highlights that brain functioning has become crucial to understand the learning processes based on the fact there is an emerging necessity to approach new knowledge accurately in response to the new needs witnessed in the new generation of students. Moreover, learning is related to age based on the plasticity of the brain needs to be trained at early ages to promote chaotic networks that permit the assimilation and use of the foreign language, the bigger exposure to the new language babies have the greater linguistic ability is developed.

Finally, learners in the so-called "elegant age" (approximately 55 years and older) experience age-related changes in brain function due to their age; nonetheless, the changes can be slowed down and partially stopped if the brain keeps active by means of

foreign language learning consequently, new networks could appear when the language learning continues during adulthood.

On the other hand, Apakina et al. (2020), mention that the neurodidactic principles are adaptable to the teaching and learning of foreign languages to integrate principles of individualization and differentiation. In addition, they mention that there are no specific ideas to adapt neuroscience traits to language teaching; however, they showed successful results in applying neurodidactics to the foreign language classroom. In the article mentioned, the authors highlight the growing interest in foreign language teaching and the use of neurodidactic strategies to enhance language learning in an interactive, engaging, creative, and personalized manner. By understanding the brain, its structure and connections, both teachers and students become more aware of effective practices that support successful learning for all.

EFFECTIVE TEACHING STRATEGIES

There are innumerable methods and strategies proposed in the literature to apply in the classroom. Though, not all of them are effective in all of the contexts. It is crucial for teachers to be aware of the challenges faced when teaching understanding that they have an impact on their students. Consequently, there is a huge responsibility in the pedagogical exercise; therefore, observation, inquiry and reflection to get to know their learners is crucial.

According to Gitsaki, C, & Zoghbor, W. (2023), who developed a study at a higher education institution, where the impact of a scholarship program was developed with university professors. Having mentioned this, the program had the intention to make professors aware of their pedagogical practices by means of inquiry and reflection. The program was divided into 5 sessions of 120 hours where they were accompanied to raise an inquiry based on their teaching to later create a research project to solve the issue encountered. After the evaluation of the impact of the program, three case studies took place which showed the benefits of including reflection of the teaching strategies and the inclusion of action research into the classrooms. The 3 informants in the case studies showed the positive impact of the program in their professional and pedagogical development. It was concluded that however inquiry related strategies are time demanding and require discipline from them, the benefits for the learning community are worthy enough to continue in constant reflection at the time of teaching.

PRE-SERVICE TEACHERS' STRATEGIES

Teachers need to develop different strategies to be successful in their professional and pedagogical practices in order to promote learning in their students and have an impact on their community, they are called to overcome several challenges and be in constant professional development to face the challenges that arise day by day, in that sense, pre-service teachers need to develop those strategies by their own while they acquire experience, know and interact with their students which becomes even more challenging.

Makoa & Segalo (2021) developed a study to explore the apprentice teachers' experiences on their professional development, they answered the research question: What are the challenges apprentice teachers face towards their school-based professional development? An interpretive qualitative research approach was used in this study. A purposive sample of 34 pre-service teachers was used. The sampled apprentice teachers were based in five different schools in one district of education in Gauteng, South Africa. The conclusions found showed the necessity to provide novice teachers with enough tools to apply effective strategies in their classrooms, as well as to permit them to have professional development opportunities with the accurate time and the chance to exchange their ideas to their peers.

This section discussed the four main themes of the research, which provide the theoretical foundation for exploring the findings within a strong epistemological framework.

The following section outlines the methodology used to identify the neurodidactic strategies that pre-service teachers need in order to engage their students in creative and meaningful ways.

METHODOLOGY

In order to carry out an accurate and high-quality research, a mixed methodology with qualitative preponderance is put into practice, which according to Hernández and Mendoza (2020) is characterized by its precision in the results when bringing together various study techniques and instruments.

The research population was intentionally probabilistic, since it was selected by the researchers from the beginning of the study. The decision was made to work with 21 pre-service teachers who study in the LLM-English at UGC, since it is expected to contribute to an improvement in the teaching-learning process of the program, and it is intended to favor the teaching practice of the population.

INSTRUMENT VALIDATION AND APPLICATION PROTOCOL

For the execution of the methodology, the following protocol was considered in order to guarantee enough validity to the data gathered. Firstly, the research proposal was discussed with the director of the LLM-English of the Faculty of Education Sciences at UGC, to appreciate his discernment and obtain his approval. Secondly, the proposal was socialized to the research leader of the faculty, obtaining her official consent. As a consequence of it, the research department of the faculty sent to the researchers an official minute, making official the beginning of the research.

Moreover, the data collection techniques used throughout the development of the research were designed, reviewed, and modified with advice from two experts in the teaching of a second language at UGC.

To start collecting the research data, the 21 pre-service teachers at UGC were asked to accept the informed consent by Google Forms in order to make sure the data from the participants remained anonymous.

INSTRUMENTS AND APPLICATION

In this way, the exploratory phase was initiated, highlighting the research problem and its relevance. Various research techniques were applied to 21 pre-service teachers who were currently teaching only English, with the intention of expanding to other foreign languages throughout their professional development.

Initially, a survey was conducted using a closed- and open-ended online questionnaire, through which the population of pre-service teachers was characterized. In this instrument, participants shared their early teaching experiences. The data were analyzed using both deductive quantitative methods and thematic analysis.

In addition, the focus group technique was conducted with the 6 participating pre-service teachers (5 from the daytime program and 1 from the nighttime program), who accepted to participate voluntarily, and it was moderated by two guiding facilitators (researchers) without participation in the generation of ideas, in accordance with García (2017). For this technique was implemented the narrative and discourse analysis method, which was suitable for interpreting how teachers express their experiences, beliefs, and identities in their own words (Fairclough, 2013).

The researchers decided to administer both the closed- and open-ended questionnaire and the focus group in Spanish to ensure that participants felt confident expressing their feelings and experiences in their native language. Accordingly, all responses were translated from Spanish into English.

Finally, the direct and systematic observation technique was applied to the sample of 6 pre-service teachers during the focus group session, following the definition by López and Sandoval (2016), who describe it as the process of obtaining information directly from the study sample. The instruments used for this observation included an observation form, photographic and voice recordings. A thematic analysis was conducted to identify recurring behaviors, emotional expressions, teaching strategies, and classroom dynamics.

CODING PROCESS

First, Table 1 presents the coding scheme applied to the closed- and open-ended questionnaire responses.

Participant Code	**Meaning**
TQ1	Teacher Questionnaire 1
TQ2	Teacher Questionnaire 2
TQ3	Teacher Questionnaire 3
TQ4	Teacher Questionnaire 4

TQ5	Teacher Questionnaire 5
TQ6	Teacher Questionnaire 6
TQ7	Teacher Questionnaire 7
TQ8	Teacher Questionnaire 8
TQ9	Teacher Questionnaire 9
TQ10	Teacher Questionnaire 10
TQ11	Teacher Questionnaire 11
TQ12	Teacher Questionnaire 12
TQ13	Teacher Questionnaire 13
TQ14	Teacher Questionnaire 14
TQ15	Teacher Questionnaire 15
TQ16	Teacher Questionnaire 16
TQ17	Teacher Questionnaire 17
TQ18	Teacher Questionnaire 18
TQ19	Teacher Questionnaire 19
TQ20	Teacher Questionnaire 20
TQ21	Teacher Questionnaire 21

Table 1. Closed- and open-ended questionnaire coding

Note. Own elaboration.

Secondly, participants in the focus group were assigned the following codes (see Table 2).

Participant Code	**Meaning**

T1	Teacher 1
T2	Teacher 2
T3	Teacher 3
T4	Teacher 4
T5	Teacher 5
T6	Teacher 6
R1	Researcher 1
R2	Researcher 2

Table 2. Focus group coding
Note. Own elaboration.

RESULTS AND DISCUSSION

First Phase

The categorization phase of the study analyzed various demographic aspects of the participating teachers, including their ages, which ranged from 20 to 33 years old, and their academic semesters, which spanned from the 6th to the 8th. Participants were enrolled in both day and night programs at UGC. Additionally, it was found that these teachers taught students aged between 10 and 70 years, in groups ranging from 1 to 350 students. The majority of their students were at the Basic level (A1 and A2), followed by the Intermediate level (B1 and B2), while the Advanced level (C1) had the fewest students.

For the categorization of the population the following results were obtained. Figure 1 illustrates that most participants are aged between 20 and 23, highlighting that the target population comprises young adults at the beginning of their teaching careers. This makes them a particularly relevant group for this study.

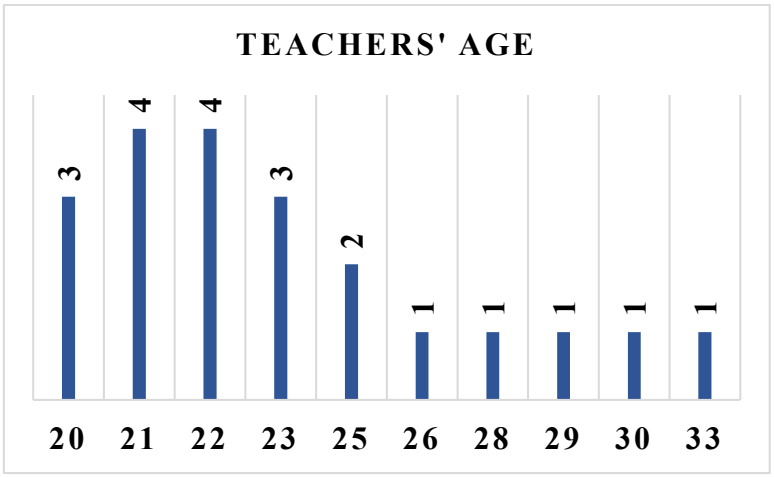

Figure 1. Teachers' age
Note. Own elaboration.

This demographic profile is significant in the context of neurodidactics. Younger teachers may be more open to experimenting with innovative, brain-based teaching strategies and integrating technology or active learning approaches into their practice. Their proximity in age to pre-service teachers may also foster more empathetic and relatable mentorship experiences. The presence of older participants (ages 26–33) adds diversity to the teaching group and may bring varying levels of classroom experience, which enriches the implementation of strategies. This mix supports a dynamic exchange of perspectives, enhancing the reflective and adaptive nature of neurodidactic methodology.

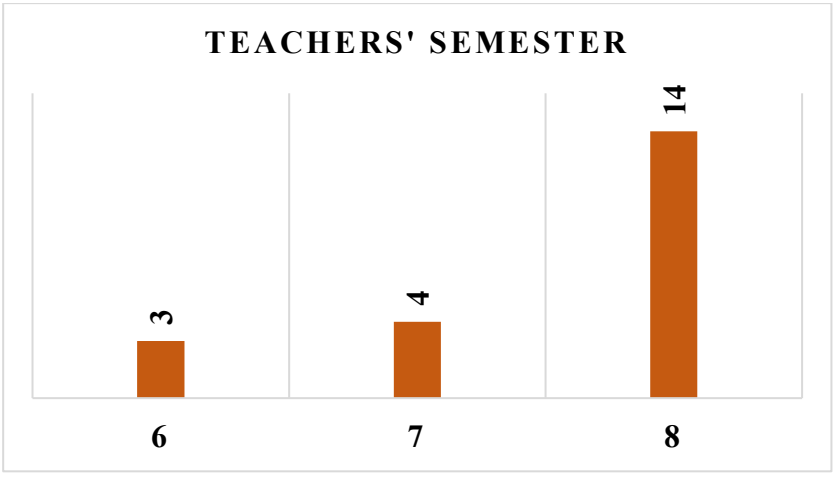

Figure 2. Teachers' semestre
Note. Own elaboration.

Figure 2 shows the academic semester of the pre-service teachers. The majority (14 out of 21) are in their 8th semester, while smaller groups are in the 7th (4 participants) and 6th semesters (3 participants). This distribution indicates that most participants were in the final stages of their teacher education program, likely involved in practicum or internship experiences. Their advanced academic standing suggests they had sufficient pedagogical knowledge and classroom exposure to implement neurodidactic strategies with intentionality and critical reflection. Having predominantly final-semester

participants also highlights the relevance of integrating neurodidactics into the later phases of teacher training. This timing allows future teachers to test innovative strategies in real classroom settings while consolidating theoretical learning, thus bridging the gap between educational neuroscience and practical pedagogy.

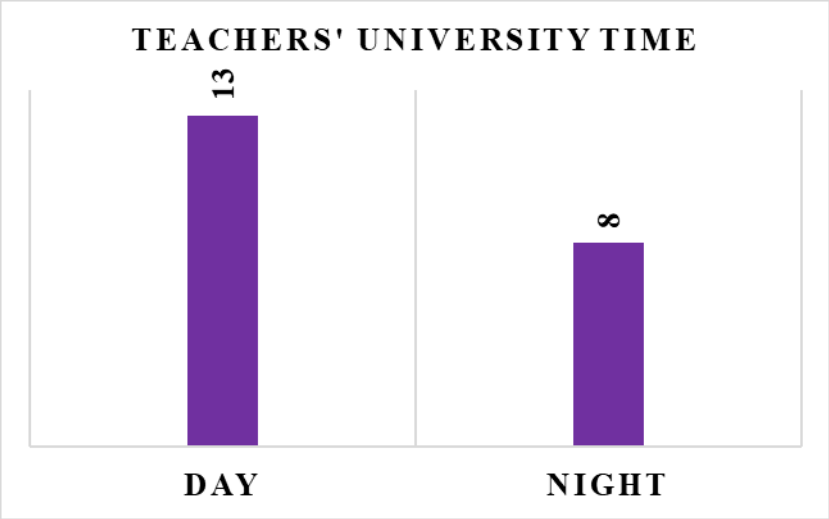

Figure 3. Teachers' university time
Note. Own elaboration.

In addition, Figure 3 illustrates the university schedules of the pre-service teachers. A majority (13 teachers) belong to the day program, while a smaller group (8 teachers) attend the night program. This distribution reflects a diverse sample in terms of academic routines and likely professional or personal responsibilities. Daytime students may have more continuous access to university resources and structured support, potentially influencing their readiness and energy to apply new methodologies such as neurodidactic strategies.

Night program participants, on the other hand, often balance studies with work or family duties, which may affect how they adopt and adapt teaching strategies. Acknowledging this diversity is crucial when evaluating the feasibility and scalability of neurodidactic approaches in varied teaching contexts.

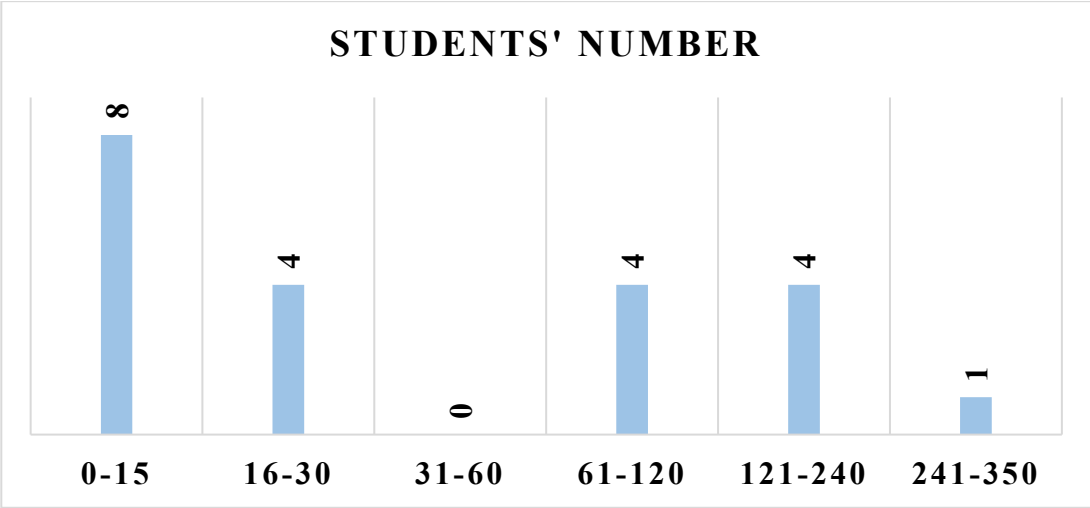

Figure 4. Students' number

Note. Own elaboration.

Figure 4 displays the number of students impacted by the teacher's lessons. Most pre-service teachers (8) worked with small groups of 0–15 students. The rest were distributed fairly evenly across the 16–30, 61–120, and 121–240 ranges (4 teachers in each), while only 1 teacher reported working with a large group of 241–350 students. Notably, no teachers reported working with 31–60 students. This data reflects a predominance of small-group teaching contexts, which are especially conducive to neurodidactic approaches. Smaller groups allow for greater personalization, emotional connection, and immediate feedback, core principles in brain-based education. Teachers can better apply strategies like multisensory engagement, formative assessment, and social interaction when group sizes are manageable (Lander, N., et al., 2024). The presence of a few teachers with larger student loads also provides insight into the adaptability of neurodidactic strategies across diverse educational contexts, highlighting both challenges and opportunities for scaling innovation.

The language proficiency levels of students taught by pre-service teachers is seen in Figure 5. This distribution suggests a strong focus on early-stage language learners. Neurodidactic principles are especially impactful at the basic level, where emotional safety, visual aids, repetition, and engaging routines are essential for language acquisition (Wahl Harry, 2023). Strategies such as storytelling, gesture-based input, and multimodal activities support vocabulary retention and foundational grammar understanding (Zhang, Y., & Liu, X., 2024). At the intermediate and advanced levels, although less frequent, the application of neurodidactics remains valuable, particularly for fostering motivation, deep processing, and real-world communication. These findings highlight the adaptability of neurodidactic strategies across proficiency levels, with particular emphasis on foundational stages of learning.

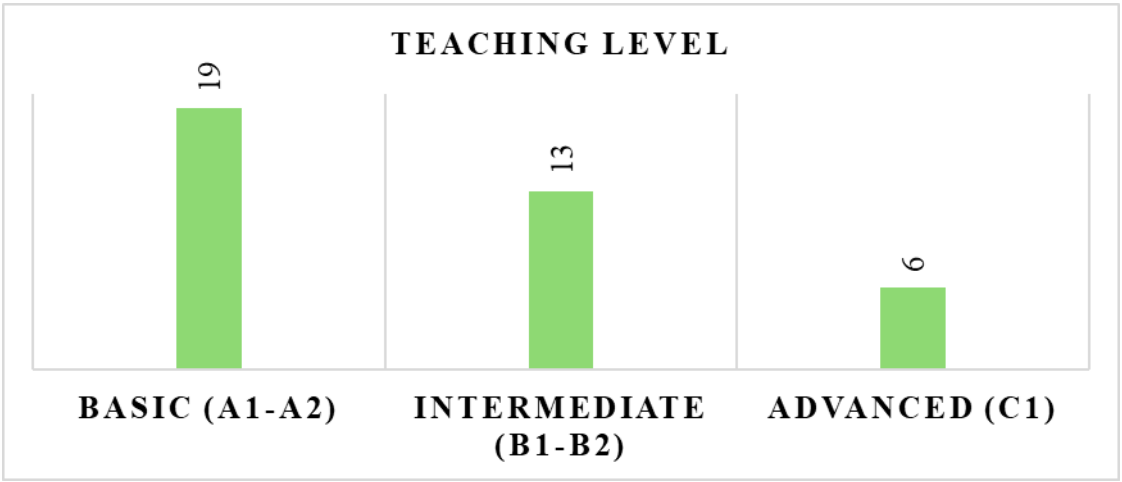

Figure 5. Teaching level
Note. Own elaboration.

Lastly, Figure 6 shows the age distribution of students who were taught English as a foreign language. This distribution suggests that most English as a foreign language instruction occurred in the participants' childhood and adolescent years, key developmental stages where the brain is highly plastic and responsive to emotionally

engaging, multisensory, and active learning approaches. Neurodidactics aligns especially well with these age groups, as it supports memory consolidation, attention regulation, and social-emotional development. The presence of implementations with older students, including adults, suggests that these strategies were flexibly adapted across age ranges. This reinforces the idea that neurodidactic principles, such as reducing cognitive overload, linking learning to prior knowledge, and promoting motivation, are valuable across the lifespan, though they may require adjustments in delivery.

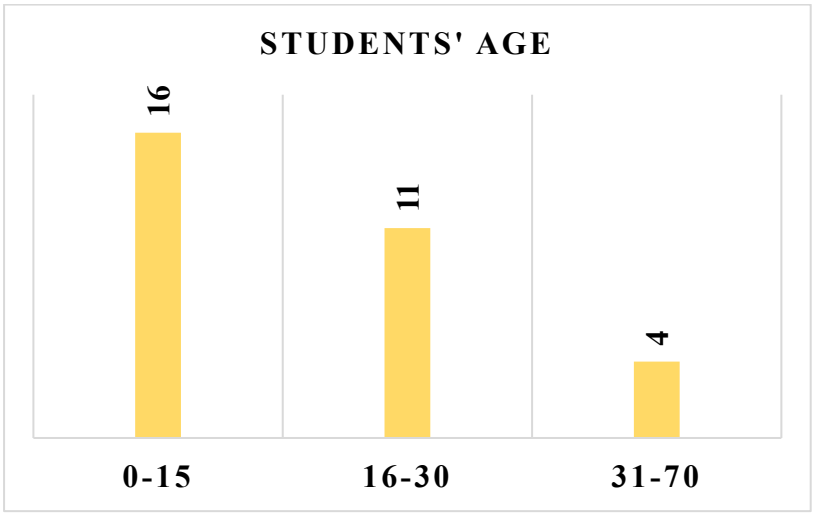

Figure 6. Students' age
Note. Own elaboration.

OPEN-ENDED RESPONSES

Based on the closed- and open-ended responses from the exploratory survey translated into English, pre-service teachers showed a strong commitment to their teaching roles, highlighting enthusiasm for student interaction, innovative methodologies, and meaningful learning "Generating interest and excitement in students to discover the world, helping them expand their expectations and learn not only knowledge but also skills that make them functional members of society" (TQ10), "Studying and planning the topics I will teach, looking for didactic activities that catch their attention. Seeing them learn makes me happy." (TQ1). However, they also expressed concerns about demotivation due to low salaries, excessive workloads, and lack of institutional support "Salary, parents, and the number of students in a classroom." (TQ9), "Attitude and mistreatment from the institution." (TQ18). Their first teaching experiences were marked by anxiety and excitement, "It was frustrating because I felt I was doing everything wrong. University classes don't always prepare you for real school problems." (TQ8), emphasizing the importance of planning and adaptability. "I was nervous about teaching, but I managed my emotions well and had excellent group control." (TQ5). Teachers see themselves as empathetic, creative, and responsible, often using audiovisual materials, practical activities, and gamification for assessment. "A teacher with a strong character, strict, funny, kind, and caring." (TQ12), "Using virtual tools that make the class more didactic." (TQ3).

Second phase
FOCUS GROUP METHOD AND FINDINGS

In the focus group discussion, all responses, originally provided in Spanish to foster a more comfortable environment, were translated into English. Participants shared their previous experiences, highlighting common warm-up and icebreaker activities they typically use (T2). They emphasized the importance of incorporating the arts, such as music, into classroom activities and stressed the value of listening to fellow teachers to gather diverse insights and advice. As one participant told, "There have been sessions in which they ask me if we can play music so that they can have their minutes of practice, of activity. I give them permission" (T4). Additionally, they noted key differences between personalized and group classes. In individual sessions, teachers have more flexibility to tailor exercises and are not bound by the same standards as in group settings. Regarding values, modeling respectful behavior was seen as a way to lead by example, supported by the use of varied methodological practices.

IMPACT ON LEARNING

The strategies implemented had a positive impact on student motivation, largely due to the integration of technology, such as apps, websites, and artificial intelligence tools, for speaking activities (T1, T2). Teachers were able to align many activities with students' interests, including music and movie-related topics. After applying neurodidactic strategies, students showed academic improvement as T5 noted "I was already noticing that they were reinforcing themselves more, that they were retaining more of the information it was given to them", gained confidence, and expressed greater happiness, particularly in recognizing new vocabulary (T3, T4). All students improved their reading and speaking skills and demonstrated increased creativity "you learn best when you are in class with your teacher if you have any doubts or questions you can ask them" (T6). T2 reported feeling more prepared and motivated to teach with love and patience, thanks to the neurodidactics guide. Similarly, T3 noted a heightened awareness of the importance of continuous learning to enhance pedagogical practices. Teachers also learned to be more visual and creative, incorporating physical activities, providing regular feedback, and using both summative and formative assessments.

SOCIAL IMPACT

The strategies also had a notable social impact. They promoted teamwork through fair competition and encouraged the integration of various art forms (T2). T1 highlighted the strategies' ability to foster interdisciplinarity (across subjects) and interculturality (across cultures), T1 mentioned, "languages are acquired or learned as they are more closely linked to a real context". Moreover, the dynamic and creative nature of these strategies helped reduce anxiety among both students and teachers, "and it's nice when they already feel confident in some way or another" (T4), partly due to the professional

development opportunities they offered. T4 mentioned that the strategies made the teaching process more enjoyable and helped teachers recognize their role within a broader educational community that influences both students and society.

CHALLENGES AND BARRIERS

Despite the positive outcomes, several challenges were identified. T1 and T5 pointed out systemic issues within the educational system, particularly the lack of support from parents and institutions. As young teachers implementing new practices for the first time, they often felt underestimated. Some parents preferred traditional teaching methods over innovative ones, such as game-based learning. T4 discussed the difficulty of building trust with students and overcoming the perception of the teacher as the sole authority figure. T6 emphasized the need for support from school psychology departments to address students' neurological and cognitive differences with appropriate approaches, T6 explained, "the school where I work is a very friendly environment among teachers and we help each other".

Time management emerged as a significant challenge. Teachers struggled to balance teaching responsibilities with the need to provide thoughtful feedback and handle administrative tasks. They reported insufficient time to complete all required duties. In virtual classes, some students did not turn on their cameras, leading to reduced interaction, lower motivation, and weaker classroom management "we are not certain that the student is not using a translator, does not have other notes, is not distracted by family members" (T4). Finally, T4 stressed the need for more language practice to help students achieve higher levels of language proficiency.

SUGGESTIONS AND FINAL COMMENTS

Finally, regarding suggestions and comments, the teachers recommended incorporating more technological activities to enhance active learning, aligning them with neurodidactic strategies to improve student learning outcomes. They also suggested activities such as video recordings (e.g., TikTok), video games, and outdoor experiences to make learning more meaningful and relevant to students' interests. These approaches aim to deepen students' understanding of how the brain functions and learns.

To emphasize the importance of developing practical activities within the subjects studied during the Bachelor's program, with the goal of equipping future teachers with real tools they can apply in their classrooms. They also highlighted the need to implement the approaches, methods, and techniques discussed in their coursework to generate more ideas for effective teaching practices.

Additionally, the teachers noted that the neurodidactics guide provided valuable tools for designing more impactful lesson plans. It also strengthened their sense of vocation, inspiring them to teach with love and dedication, "it is very important to have the knowledge and vocation, as well as the interest to teach with love" (T2). T3 underscored the importance of values and integrity in the teaching profession and suggested that the guide could place greater emphasis on these aspects.

The focus group revealed that motivation was a central theme, with teachers recognizing its essential role in successful language acquisition. They acknowledged the dual nature of technology, as both a powerful educational tool and a potential source of distraction, as T3 stated, “I was implementing new technologies, different, let's say, in pages, networks, so that the students would suddenly feel closer to the subject”. Pre-service teachers also valued teamwork, interculturality, and interdisciplinary approaches.

The implementation of neurodidactic strategies positively influenced students’ motivation, creativity, and language skills, while also enhancing teachers’ reflective practices, T3 noted, “motivation plays an important role in the acquisition of a new language”.

Socially, these strategies promoted collaboration and reduced anxiety among students. However, several challenges were identified, including limited institutional support, time constraints, and difficulties in classroom management, particularly in virtual settings. Pre-service teachers also highlighted the need for more opportunities to practice the language and for psychological support for students with special needs, “it is like a different way to enter the class, not so structural, but to start in a different way, so the class becomes more playful” (T2).

Despite these challenges, the neurodidactic approach was widely regarded as a valuable and transformative tool in modern language education, “these neurodidactic strategies and that above all focus on knowing how it works, what happens here in the brain, in the cognitive processes” (T1).

OBSERVATION METHOD AND FINDINGS

The observation method was conducted using a structured form focused on body language, emotional expression, and behavioral patterns. This form was applied to 6 pre-service teachers (five from the daytime program and one from the nighttime program) during the focus group session. The categories included body language, emotions, behavioral patterns, and additional observations.

BODY LANGUAGE

Throughout the session, the pre-service teachers demonstrated strong engagement. Most frequently, they nodded in agreement while listening to the researchers, indicating attentiveness and alignment with the topics discussed. Eye contact was consistently maintained, both among the participants and with the researchers, suggesting support and mutual understanding. The pre-service teachers showed a genuine interest in contributing their experiences and opinions. Many used hand gestures while speaking, emphasizing their points and enhancing communication. T3, T5, and T6, in particular, used expressive movements, such as raising their eyes to recall past experiences. Notably, none of the participants used their phones during the session, which reflected respect and full involvement.

EMOTIONAL EXPRESSION

In terms of emotional expression, the teachers displayed high levels of enthusiasm, especially when sharing personal experiences related to the neurodidactics guide. Their frequent smiles and focused attention indicated that they felt welcomed and valued. Their discourse reflected a strong sense of professionalism, as they often supported their ideas with theoretical frameworks and rhetorical strategies.

BEHAVIORAL PATTERNS

Motivation emerged as the most significant theme in this category. The pre-service teachers emphasized its central role in the teaching and learning process, particularly in acquiring and mastering a foreign language. They linked motivation closely with feedback, noting that consistent guidance from teachers helps students stay engaged and aware of their progress.

Technology was also highlighted as a key pattern, viewed both as a powerful educational tool and a potential source of distraction. Pre-service teachers expressed the need to apply it thoughtfully, considering ethical implications and its impact on student focus.

T4 emphasized the importance of building student confidence to encourage participation both inside and outside the classroom, a point echoed by T6. T1 stressed the inclusion of interculturality and interdisciplinarity in language teaching, acknowledging the challenges of integrating these elements to create a holistic learning environment. T2 and T5 highlighted the value of teamwork among colleagues for sharing strategies and improving teaching practices. Additionally, T2 and T6 emphasized the importance of innovation in teaching, as encouraged by the neurodidactics guide, and the need for reflective and research-based pedagogical practices.

OTHER OBSERVATIONS

In the final category, T1, T2, T4, and T5 identified several key elements that enhance teacher motivation and effectiveness. These included assertive communication, empathy, emotional intelligence, discipline, and support from family and the broader social environment. These factors were seen as crucial for enriching teaching experiences and preparing educators to handle future challenges.

As it is shown in Figure 7 (fragment), the neurodidactic strategies were updated and presented in a checklist guide, based on the data collected through the focus group method and the conclusions drawn by both the population and the researchers of the study.

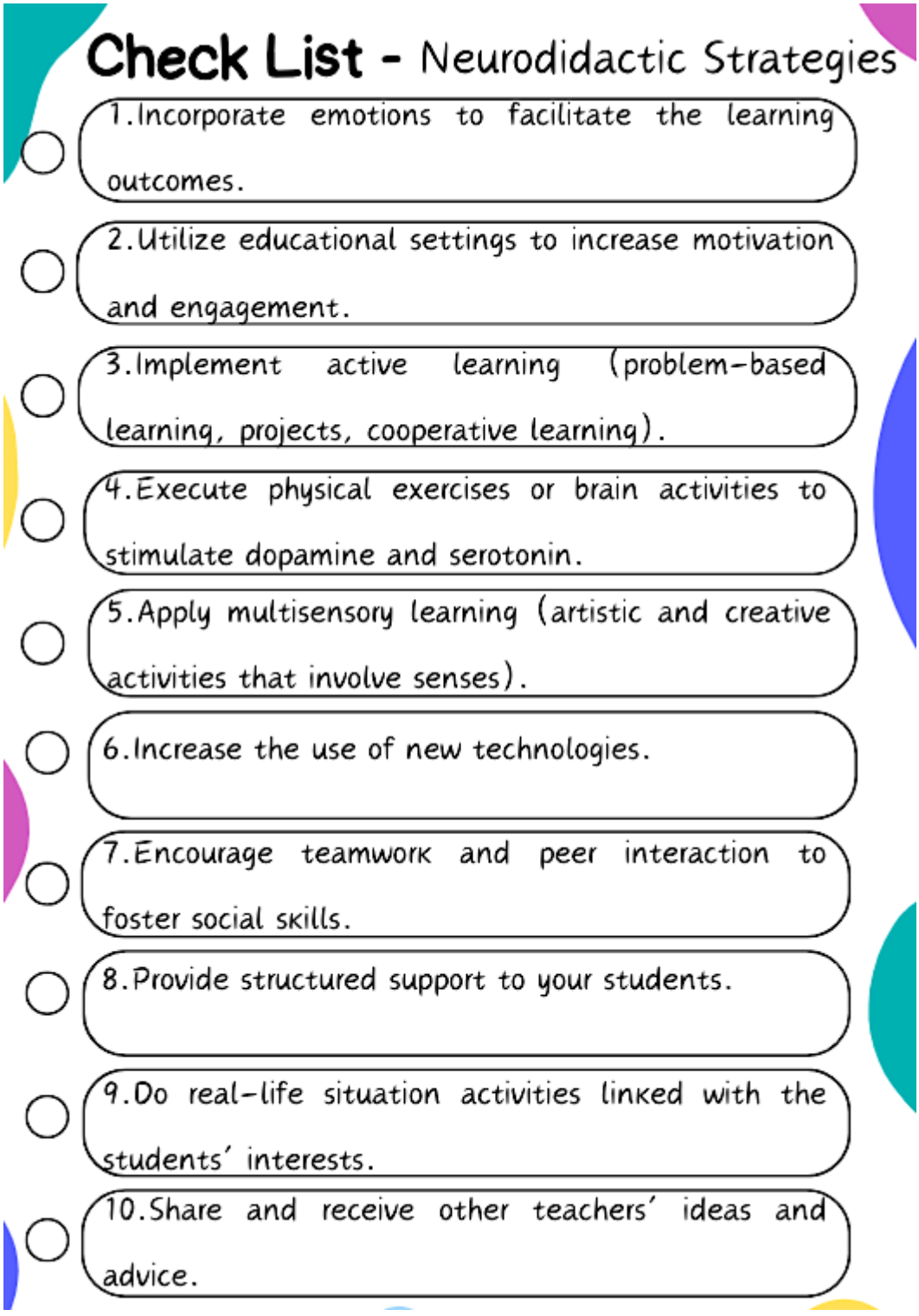

Figure 7. Check list of neurodidactic strategies
Note. Own elaboration.

CONCLUSIONS

The initial approval for the project had to overcome the lack of existing knowledge on the field of neurodidactics witnessed some drawbacks and the justification for the application of the strategies had to be strongly demonstrated however, the development of the study permitted to show how the strategies applied respond to the current demands

of the English learners.

The exploratory phase of the research reveals that teachers in the study demonstrate the ability to teach English from basic to advanced levels to diverse groups ranging from 1 to 350 students, aged 10 to 70. This highlights their adaptability and skill in managing varied learning contexts.

Challenges include managing large groups, student indiscipline, and limited resources. In the closed- and open-ended questionnaire many teachers recognize the need to improve time management and classroom control. While knowledge of neurodidactics is limited, there is a clear interest in learning more about brain-based teaching strategies. Related to some authors' positions and research analysis, the theoretical framework guides the integration of neurodidactic strategies, emphasizing neuroscience as a tool to enhance motivation, creativity, and authenticity in language teaching.

During the focus group and observation methods, pre-service teachers show strong enthusiasm and openness to applying these strategies, which help them better understand their students and refine their own teaching practices. Interestingly, the researchers find that many of these "pre-service" teachers have already exhibited professional maturity and dedication.

The neurodidactic guide developed for the study became a valuable resource, offering practical, accessible strategies for both novice and experienced educators. Based on teacher feedback, the guide is refined to improve its quality and relevance for classroom application.

The implementation of neurodidactic strategies encouraged pre-service teachers to engage in deeper reflection about their teaching identity. Many reported a shift in perspective—from delivering content to actively facilitating learning processes tailored to students' cognitive and emotional needs. This reflection aligns with the broader goals of teacher education focused on professional growth and lifelong learning.

The study underscores the importance of including neurodidactic principles in pre-service teacher education. By equipping future educators with neuroscience-informed strategies, teacher preparation programs can bridge the gap between theory and practice, fostering more effective and empathetic classroom practices from the start of a teacher's career.

The strategies proved effective not only across proficiency levels but also in various teaching settings, including early childhood, adolescence, and adult education, as well as day and night programs. This flexibility reinforces the cross-contextual relevance of neurodidactics, making it a versatile framework in increasingly diverse English language classrooms.

Despite being in training, many participants acted as innovators in their practicum contexts, adapting and even redesigning strategies based on student needs. This reveals a strong potential for teacher agency and leadership when future educators are empowered with updated pedagogical tools grounded in neuroscience.

The study highlights the necessity of greater institutional support for implementing neurodidactic practices. This includes access to training, teaching materials, and manageable class sizes. Without such support, even highly motivated teachers may struggle to apply these strategies effectively and sustainably.

This exploratory study opens avenues for longitudinal research that can measure the long-term effects of neurodidactic strategies on language acquisition, student motivation, and teacher development. Such research could further validate the approach and support its integration into curriculum design and policy.

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