Strategies in neuroeducation and emotion-based learning for classroom motivation

Estrategias en neuroeducación y aprendizaje basado en la emoción para la motivación en el aula

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ABSTRACT

Neuroeducation and emotion-based learning represent complementary approaches that seek to optimise the teaching and learning processes, with an emphasis on motivation in the classroom. This study aims to describe the strategies in neuroeducation and emotion-based learning. A descriptive-documentary methodology was applied, reviewing 25 scientific sources published between 2018 and 2024. The results show that neuroeducational strategies, such as the use of neuroscientific principles and recreational activities, improve cognitive processes such as attention and memory. Meanwhile, emotion-based learning encourages active participation and engagement through the generation of positive emotions. It is concluded that the integration of both approaches promotes a positive learning environment, strengthens the teacher-student relationship and maximises academic performance.

Descriptors: neuropsychology; educational psychology; educational psychosociology. (Source: UNESCO Thesaurus).

RESUMEN

La neuroeducación y el aprendizaje basado en la emoción representan enfoques complementarios que buscan optimizar los procesos de enseñanza y aprendizaje, con un énfasis en la motivación en el aula. Este estudio tiene como objetivo describir las estrategias en neuroeducación y aprendizaje basado en la emoción. Se aplicó una metodología descriptivo-documental, revisando 25 fuentes científicas publicadas entre 2018 y 2024. Los resultados evidencian que las estrategias neuroeducativas, como el uso de principios neurocientíficos y actividades lúdicas, mejoran procesos cognitivos como la atención y la memoria. Por su parte, el aprendizaje basado en la emoción fomenta la participación activa y el compromiso mediante la generación de emociones positivas. Se concluye que la integración de ambos enfoques promueve un ambiente de aprendizaje positivo, fortalece la relación docente-estudiante y maximiza el rendimiento académico.

Descriptores: neuropsicología; psicología de la educación; psicosociología de la educación. (Fuente: Tesauro UNESCO).

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INTRODUCTION

Neuroeducation is presented as an interdisciplinary field that combines neuroscience, psychology and education to optimise teaching and learning processes, according to Chen et al. (2022), neuroscientific principles can be applied in areas such as reinforcement learning, which allows predicting reward-driven behaviours. Although this approach is not directly focused on the classroom, its application in predicting learning trajectories can be useful for personalising educational strategies. On the other hand, Halkiopoulos & Gkintoni (2024), mention that the use of artificial intelligence (AI) in personalised learning, based on cognitive neuropsychology.

Consequently, neurolearning, as described by Pupo (2023), integrates human activity and ecosophy to promote a holistic view of learning, highlighting the importance of connecting learning with the environment and emotions, which fosters a deeper and more meaningful integration of knowledge. Furthermore, Leisman (2022) argues that neuroscience in education still faces challenges in building a solid bridge between research and practice. However, he emphasises that understanding how the brain processes information can help teachers design more effective strategies, especially when considering emotions as an important factor in learning.

Another critical aspect in neuroeducation is the persistence of neuromyths, as Torrijos-Muelas et al. (2021) point out, these myths, such as the idea that we only use 10% of our brain or that students have specific learning styles (visual, auditory, kinaesthetic), can limit the effective implementation of evidence-based strategies. It is therefore essential that educators are trained to distinguish between myths and actual scientific results. On the other hand; in the field of mathematics, Lekati & Doukakis (2023) explore how neuroeducation can transform educational practices, although their vision does not directly include emotions, they highlight that understanding the cognitive processes underlying mathematical learning can improve teaching and student motivation.

On the other hand; an innovative approach is that of Ortega-Sierra et al. (2022), who propose neurorehabilitation programmes in neurosurgical patients, although their main application is not in the classroom, these programmes highlight the importance of neuroeducation in therapeutic contexts, which could inspire educational strategies for students with special needs. In addition, Schmied et al. (2021) address the acceptability of neuroscientific interventions in education.

Thus, it is proposed as a research objective to describe strategies in neuroeducation and emotion-based learning for motivation in the classroom.

METHOD

A descriptive-documentary research was applied, which is based on the review and analysis of secondary sources to collect, systematise and analyse information on strategies in neuroeducation and emotion-based learning for motivation in the classroom. The methodological stages developed are detailed below:

A search of scientific literature published between 2018 and 2024 was conducted using academic databases such as Scopus, Web of Science, PubMed and Google Scholar.

Twenty-five references were collected and organised into a database. This stage allowed us to identify patterns and trends in the literature reviewed.

A qualitative analysis of the documents was carried out, using content analysis techniques to identify strategies in neuroeducation and emotion-based learning, as well as their impact on motivation in the classroom.

The results were organised in a comparative table (Table 1) summarising the strategies identified, their authors and their impact on motivation in the classroom. This systematisation made it possible to visualise in a clear and structured way the contributions of each study to the field of neuroeducation and emotion-based learning.

A critical reflection was made on the results presented in table 1, contrasting the proposed strategies with the current needs of the educational context.

As this was a documentary study, no human subjects were involved and no primary data collection was required. However, copyright was respected and all sources used were properly cited, following APA standards (7th edition) to ensure academic integrity.

RESULTS

Strategies in neuroeducation and emotion-based learning complement each other to foster motivation in the classroom, while neuroeducation focuses on cognitive processes such as memory, attention and active learning, emotion-based learning uses emotions as a catalyst to enhance the educational experience; in this sense, a comparative analysis is presented in table 1:

Table 1. Strategies in neuroeducation and emotion-based learning for classroom motivation.

Author(s)	Strategies in neuroeducation	Emotion-based learning	Impact on classroom motivation
Araya-Pizarro & Espinoza Pastén (2020)	Use of neuroscientific principles to design educational activities.	Recognition of emotions as a basis for meaningful learning.	Improved attention and memory in students.
Baena-Extremera et al. (2021)	Integration of physical activity with neuroeducation.	Promotion of positive emotions through physical activity.	Increasing intrinsic motivation in physical education.
Carrillo-Cusme & Zambrano-Montes (2021)	Application of neurodidactic strategies such as games and dynamics.	Use of emotions to encourage active participation.	Increased interest and participation in the classroom.
Cedeño et al. (2024)	Focus on psychological processes such as memory and attention.	Emotional regulation to optimise learning.	Improved information retention and academic performance.
Dubinsky & Hamid (2024)	Active learning based on neuroscience.	Generating positive emotions through direct interaction.	Increased motivation and engagement of students.
Espinoza-Rodríguez et al. (2024)	Neurodidactic strategies for experimental sciences.	Use of emotions to connect abstract concepts with real experiences.	Improving meaningful learning in science.
Figueroa & Farnum (2020)	Neuroeducational interventions to overcome learning difficulties.	Using emotions to reduce anxiety in learning.	Increasing confidence and motivation in children with difficulties.
Gola et al. (2022)	Developing the 'teaching brain' to improve teaching.	Recognition of student emotions to personalise teaching.	Improvement of the teacher-student relationship and motivation.
Jolles & Jolles (2021)	Neuroscience literacy for educators.	Understanding the relationship between emotions and learning.	Increased teaching effectiveness and student motivation.
Mora-Arístega (2022)	Neurolearning as a tool for improving teaching practice .	Using emotions to create a positive learning environment .	Increased motivation and academic performance.
Pherez et al. (2018)	Neuroeducational tools to improve teaching practice.	Generating positive emotions to facilitate learning.	Improving students' disposition towards learning.
Sosa et al. (2022)	Relationship between neuroscience, motivation and self-regulation.	Using emotions to promote self-regulation in learning.	Increase in students' autonomy and motivation.
Vargas-Tipula et al. (2024)	Neuroscience-based strategies to personalise learning.	Use of emotions to connect learning to previous experiences.	Improved motivation and meaningful learning.

Source: Own elaboration.

Neuroeducational strategies are based on the application of neuroscientific principles to the design of learning experiences, which optimise essential cognitive processes such as attention, memory and information retention. Therefore, Araya-Pizarro & Espinoza Pastén (2020) affirm the importance of these strategies for structuring educational activities that favour meaningful learning. Baena-Extremera et al. (2021) and Carrillo-Cusme & Zambrano-Montes (2021) propose the integration of physical activities and playful dynamics as neurodidactic tools that promote the active participation and interest of students.

Likewise, the development of the "teaching brain" (Gola et al., 2022) and neuroscientific literacy for educators (Jolles & Jolles, 2021) emerge as elements for teacher professionalisation, these proposals allow educators to understand the neurobiological foundations of learning and adapt their pedagogical practices more effectively, which has a direct impact on the motivation and performance of students, in this sense, teacher training in neuroeducation is articulated as a priority need for the improvement of educational processes.

Emotion-based learning is presented as a central axis in the construction of meaningful educational experiences, the authors agree that positive emotions play a fundamental role in facilitating learning and improving academic performance, therefore, Dubinsky & Hamid (2024) and Pherez et al. (2018), comment that the generation of positive emotions, through direct interaction and neuroeducational tools, increases commitment and willingness to learn. Similarly, emotional recognition and regulation (Cedeño et al., 2024; Gola et al., 2022) are essential strategies to personalise teaching and optimise educational outcomes.

In the field of learning difficulties, Figueroa & Farnum (2020), promote the use of emotions to reduce anxiety and foster confidence in students, which results in an increase in intrinsic motivation. From the above, the importance of emotions is highlighted not only as facilitators of learning, but also as mediators in overcoming emotional barriers that limit academic performance.

The impact of these strategies on student motivation is evident in the results reported by the authors. The improvement of cognitive processes such as attention, memory and information retention (Araya-Pizarro & Espinoza Pastén, 2020; Cedeño et al., 2024) translates into greater interest and active participation in the classroom (Carrillo-Cusme & Zambrano-Montes, 2021). Likewise, the promotion of positive emotions and the connection of learning with previous experiences (Vargas-Tipula et al., 2024) contribute to more meaningful and autonomous learning (Sosa et al., 2022).

In terms of interpersonal relationships, the personalisation of teaching based on emotional recognition (Gola et al., 2022) strengthens the teacher-student relationship, which in turn increases intrinsic motivation, reinforcing the idea that a positive learning environment, as proposed by Mora-Arístega (2022), is essential to maximise students' academic performance and engagement.

CONCLUSION

Neuroeducation and emotion-based learning effectively complement each other to foster motivation in the classroom, optimising cognitive processes such as attention and memory, while emotions act as catalysts for deeper and more meaningful learning. The integration of playful activities, dynamics and neurodidactic tools promotes students' active participation and interest, while the generation of positive emotions and their regulation increases engagement and information retention. Teacher professionalisation in these areas allows for the adaptation of pedagogical practices, strengthening the teacher-student relationship and creating a positive learning environment that maximises academic performance.

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