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TEDX METHODOLOGY: A NEW WAY OF TEACHING NEUROSCIENCE BASED ON STUDENT PERCEPTIONS

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ABSTRACT

Teaching neuroscience is challenging due to the complexity of its terminology and content. Active methodologies help to increase student motivation. TEDx is known for storytelling of all kinds, especially scientific stories that contribute to communication and the use of audiovisual resources, but they make students forget about cheat sheets and electronic devices to help them get by. A quantitative, descriptive, cross-sectional, and field study was conducted. The target population consisted of 114 students between the ages of 18 and 25. Data collection was carried out using a Likert scale survey instrument that measures meaningful learning and student motivation. The data was analyzed using descriptive statistics, specifically frequencies and percentages, and means. The findings reflect a generally positive perception. 78.9% of students strongly agreed that the TEDx methodology helped them understand neuroscience content better than before. 82.5% said it increased their interest and motivation in the subject. The TEDx methodology supports students' cognitive processing and motivational engagement. The TEDx methodology is considered an innovative, appropriate and effective pedagogical strategy for teaching neuroscience in higher education and offers an alternative way to enhance the learning experience.

KEYWORDS: Neuroscience, Meaningful Learning, Motivation, Higher Education.

1. INTRODUCTION

In recent decades, higher education has been transformed by social, technological, and epistemological changes, which require a revision of conventional teaching-learning models. Health and behavioral sciences careers face the challenge of training professionals capable

of integrating sophisticated scientific knowledge, critical thinking, communication skills, and applied skills in real and evolving situations. In this context, the teaching of Neuroscience becomes relevant due to its transversal nature and how much it can contribute to understanding human behavior, cognitive, emotional and psychopathological processes.

However, Neuroscience is considered one of the most conceptually difficult subjects in the curricula, due to its high level of abstraction, its technified language and the need to integrate knowledge from various disciplines (biology, cognitive psychology, physiology, statistics, etc.). Demotivation, learning difficulties, a negative image of the subject and even a negative apprehension of it, are just some of the consequences of the exponential decomposition of the dissertational content in the subject and the use of the decomposition of the subject as a pedagogical resource for the transmission of the subject (Mayer, 2020; Sweller, 2019).

Thus, the need to incorporate active methodologies and, in the case of higher education, innovation, which place the student as the protagonist of their learning, is evident in the current literature of the field. In this sense, the construction of learning and the optimization of the student's cognitive resources are aspects that are addressed in meaningful learning, which, due to its constructive nature, has become one of the postulates of quality in university teaching (Ausubel, 2002; Novak, 2010). Empirical research has shown that the conceptualization, contextualization, decomposition and, in turn, the positive apprehension of the subject and the negative apprehension of it in the professional context favor the facilitation of the retention, transfer, and demotivation of students in learning (Dunlosky et al., 2013; Roediger & Karpicke, 2006).

Reflecting on these approaches, cognitive neuroscience has come to better understand the brain processes of learning, memory, attention, and motivation. Classic and current studies have demonstrated the involvement of working memory, executive functions, and emotional systems in the learning of new information (Baddeley, 1992; Cowan, 2001; Diamond, 2013). Learning is not an exclusively rational process. It is mediated by emotional, social, and motivational factors that influence neural activation and information consolidation in long-term memory (Immordino-Yang et al., 2019; Pekrun, 2006).

Although cognitive load theory is relatively recent, it has provided good reasons why some instructional designs facilitate and others hinder learning. According to Sweller (2019), learning occurs when there is an optimal balance between cognitive load, intrinsic load (difficulty of the material), extrinsic load (instructional design), and German load (supports schema construction). In Neuroscience, which has a high intrinsic load, it is important to reduce the extrinsic load by using pedagogy that makes it explicit in a structured and cognitively efficient way (Rey et al., 2019; Mayer, 2020).

Active methodologies have been developed for years in the university context because they have a scientific basis to support them. Metadata analyses and systematic reviews in the field of education have shown that active learning results in superior performance, greater comprehension, and better retention than traditional teaching methods (Freeman et al., 2014; Prince, 2004). Essays, problem-based learning, the flipped classroom, the use of video tutorials, and activities in which students must participate, have been successful in the sciences and health sciences (Deslauriers et al., 2019; O'Flaherty & Phillips, 2015).

In this sense, multimedia narratives and audiovisual materials have become of utmost importance. More than one multimedia approach and cognitive load theory suggest that people learn best when information presented verbally and through graphs is organized according to the principles of segmentation, coherence, and signaling (Mayer, 2020; Paivio, 1991).

Empirical research has shown that well-crafted educational videos improve attention, engagement, and conceptual comprehension, especially when they adapt to working memory constraints and encourage active information processing (Guo et al., 2014; Zhang et al., 2006).

This is where the TEDx methodology emerges as a form of scientific communication with pedagogical potential. TEDx talks are short talks, with a narrative structure, simple language and the use of visual aids to reinforce the main ideas. Initially conceived as spaces for the dissemination of knowledge, these talks have been integrated into formal educational environments, especially in higher education (Sugimoto et al., 2013; Sugimoto & Thelwall, 2013).

For Psychology, knowing the neuroscientific bases of human behavior is part of the graduation profile, transforming Neuroscience into a training axis.

But when the contents are presented in an overly

technical, decontextualized or detached way from clinical practice, students establish an instrumental or even aversion relationship with the subject. This is where the TEDx methodology can serve as a link between theoretical neuroscience and its clinical application, exposing cases, examples and stories that connect the brain with psychological manifestations. This relationship supports the sense of usefulness and relevance, essential aspects of meaningful learning.

Perceived usefulness, that is, the extent to which students believe that what they learn will serve them in their studies or in their working lives, has also been extensively researched within the theory of self-determination and models of academic motivation (Deci & Ryan, 2000; Pintrich, 2000). When students give an instrumental and personal value to a subject, their autonomous motivation increases and, consequently, their sustained effort and self-regulation in learning increase. In this context, measuring the perceived usefulness of the TEDx methodology in Neuroscience can reveal not only its immediate effect, but also its potential to contribute to professional training in the future.

2. METHODOLOGY

2.1. Research Design

The research was approached from a quantitative approach, with a descriptive, cross-sectional and non-experimental design. This design is appropriate when the aim is to describe and understand the way in which participants live a particular educational experience, without manipulating variables or looking for cause-effect relationships. In university educational research, cross-sectional descriptive studies are methodologically correct and widely used to explore student attitudes, assessments and perceptions towards innovative methodologies.

The cross-sectional design is justified by the collection of data at a single time after the implementation of the TEDx methodology in the subject of Neuroscience. In addition, the non-experimental design is justified in the absence of control groups or comparative intervention, since the objective is not to measure causal effects on academic performance, but the effect felt by students.

2.2. Population and Sample

The sample is made up of students who were studying the subject of Neuroscience in the academic period in which the TEDx methodology was implemented. The sample was selected through intentional non-probabilistic sampling, taking as inclusion criteria the participation of students in the pedagogical activity supported by the TEDx methodology and regular attendance at the subject.

This type of sampling is common in educational descriptive research, where the aim is to collect information from a group directly involved in the learning experience being investigated. All participants were informed of the purposes of the research and their participation was voluntary.

2.3. Data Analysis

The data collected were tabulated and analyzed using descriptive statistics, using measures of frequency, percentages and means for each of the items and dimensions of the instrument. This type of analysis is suitable for discussing general trends and levels of perception in descriptive quantitative studies.

3. RESULTS

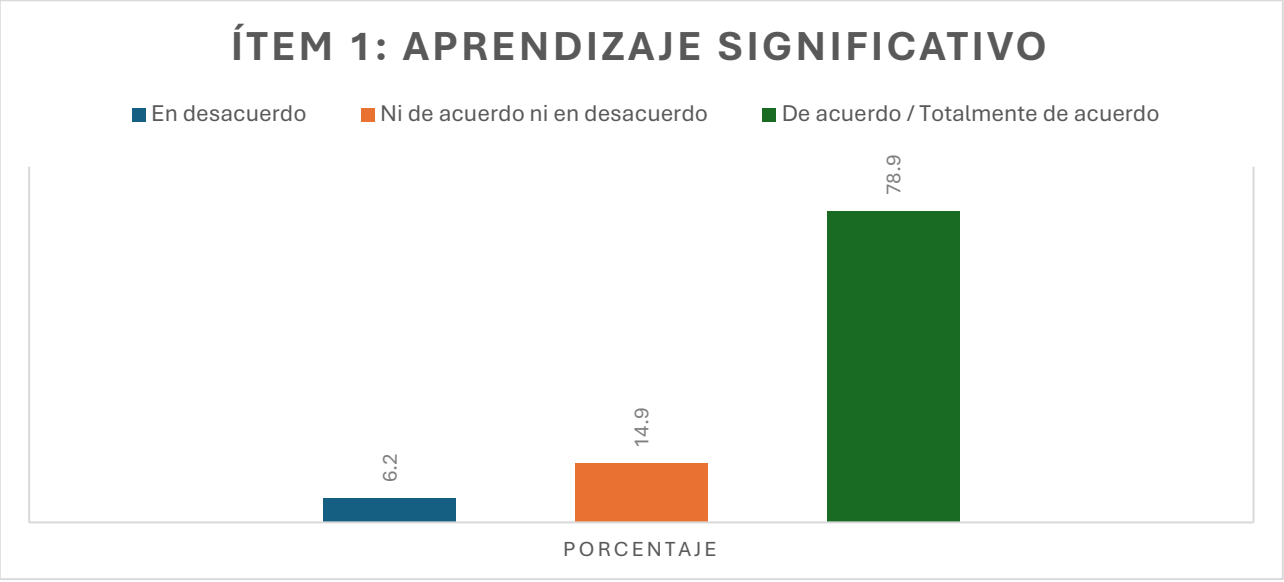

Figure 1: Meaningful Learning.

Elaboración propia (2026)

The survey of 114 students under the Likert scale modality determined that 78.9% support the TEDx methodology to understand difficult concepts. 149% indicate a neutral response. While 6.2% mention disagreeing with the strategy.

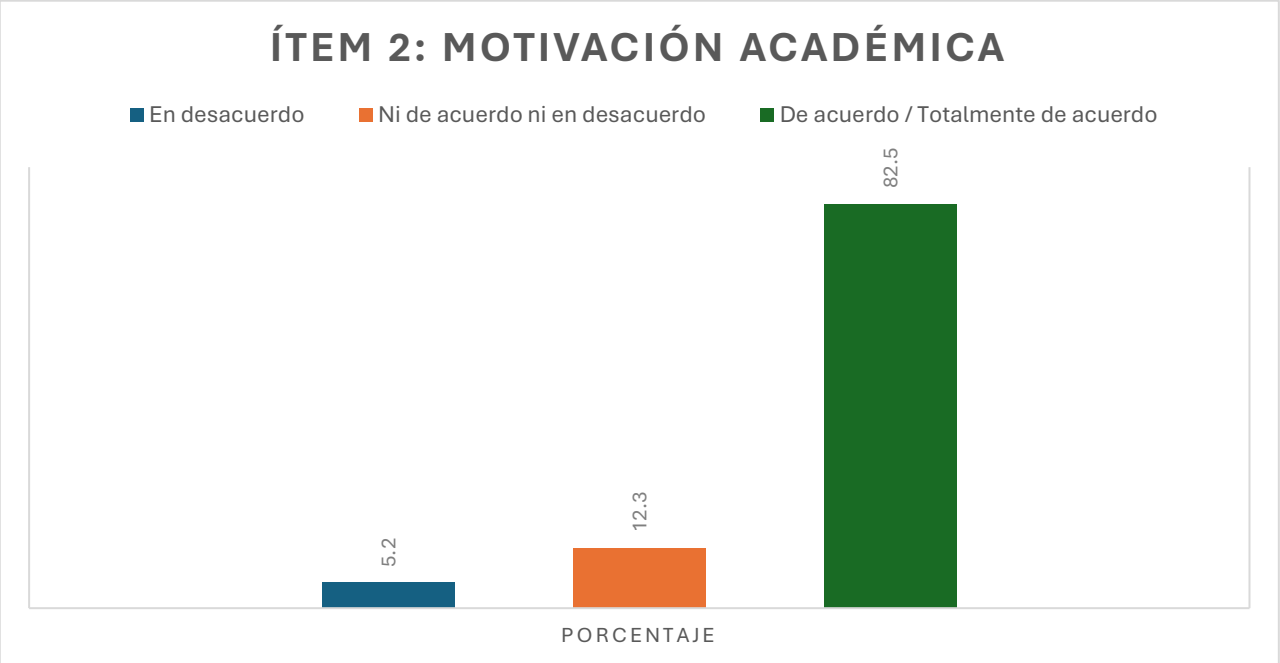

Figure 2: Academic Motivation.

Own elaboration (2026)82.5% of those consulted responded that they agreed or strongly agreed with the statement, which means that the TEDx methodology had an impact on content learning and interest in the subject. On the other hand, 12.3% of respondents chose the neutral option and only 5.2% of respondents chose the option in which they disagree. This dispersion pleases the methodology and practice that the methodology is accepted and considered the learning practice of the students' emotion and cognition. The mean of this item was slightly higher than that of the item on significant learning, which indicates that the effect of the TEDx methodology was especially noticeable in the motivational field. This finding is enlightening, since the more motivated students are, the more critical actions are expected to occur in the learning process, such as commitment, persistence, and self-regulation.

4. DISCUSSION

The results of the research support that the TEDx methodology is an effective and pertinent pedagogical way to learn Neuroscience. This positive assessment is manifested in both the cognitive aspect of meaningful and motivational learning, and reinforces the idea that innovative methodologies must be considered from a global perspective. Meaningful learning, giving greater weight to the item that assesses content comprehension, is congruent with the theory of multimedia and cognitive load learning. These theories point out that students learn best when information is presented in an organized, explicit manner and with visual supports, reducing extrinsic cognitive load and promoting the construction of mental schemas (Mayer, 2020; Sweller, 2019). The TEDx methodology, by focusing on ideas, structured narratives and appropriate visual aids, would be in line with these principles, facilitating the processing of complex information.

In Neuroscience, where content tends to be perceived as difficult and abstract, the feeling of understanding more becomes relevant. Previous research has shown that students often have difficulty integrating neurobiological concepts with psychological phenomena, bridging the gap between theory and practice. How TEDx organizes information (narrative and applied) may be helping to bridge this gap, making it more understandable how to use neuroscientific knowledge. On the other hand, studies on academic motivation reaffirm that the emotional part is an important element in the learning process. Educational neuroscience informs us that motivation and interest are learning filters that influence attention, memory, and decision-making. In this regard, the fact that more than 80% of the students expressed more interest in the subject means that the TEDx methodology managed to

generate a more attractive learning environment. These findings support theories such as self-determination, which posit that autonomous motivation is a predictor of deep and long-term learning. When students perceive an activity as interesting, relevant, and aligned with their interests and career goals, they become cognitively, affectively, and behaviorally engaged. The TEDx methodology, by using current ways of communicating that are closer to the reality of the students, would be covering these basic psychological needs. In addition, the age range of the participants (18-25 years) and the stage in which they are in their trajectory make up a context open to pedagogical innovation. At these stages they are building their academic and professional identity, so meaningful learning experiences can define their path in the discipline. The positive view found in this research shows us that exposing innovative methodologies from the beginning can weave a better and less aversive relationship towards subjects that are historically classified as difficult.

The results reaffirm the validity of descriptive studies based on student perception to evaluate pedagogical innovations in higher education. Although this design does not allow for causal inferences or comparisons with traditional methodologies, it provides information on the acceptability, usability, and subjective impact of the training experience. This data is used to make academic decisions, mainly in places where teaching and the student experience are to be improved.

But having a positive perception is not always associated with better objective academic performance. But the literature already tells us that perceived usefulness, motivation and interest are predictors of deep learning and self-regulation, so the results found could mean that, in the long run, better academic results are achieved. In that sense, the findings of this study may lay the groundwork for future research that includes measures of academic achievement and longitudinal designs.

Finally, these findings open the discussion on the role of science communication in higher education. The TEDx methodology, originally for dissemination, can be transformed into a tool with pedagogical potential when consciously adapted to the school environment. Her ability to mix scientific rigor, expository clarity and emotional connection make her a tool for teaching difficult subjects such as Neuroscience.

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