Influencia de la neurodidáctica en el aprendizaje significativo

Influence of neurodidactics on meaningful learning

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Recepción: 01 de octubre 2020
Revision: 01 de noviembre 2020
Aprobación: 20 de diciembre 2020
Publicación: 01 de enero 2021
ABSTRACT

The article aims to analyze how neurodidactics influences the upper basic education student’s meaningful learning in the province of Manabí - Ecuador. Methodologically, it was developed using quantitative research approach and a descriptive correlational study by Pearson with a non-experimental field design. The population sample was made up of 179 teachers. The affirmative hypothesis is rejected and the null hypothesis is accepted, therefore, as a result, neurodidactics influences meaningful learning, however, teachers must refine or perfect it in its application to raise the correlation value and enhance the probability that bilateral significance may generate, that is, less than 0.05. According to the results, neurodidactics is projected as a favorable and excellent influence to promote meaningful learning.

Descriptors: knowledge management; activity learning; educational psychology. (Words taken from the UNESCO Thesaurus).

INTRODUCTION

Educational policies and curricular reforms have incorporated pedagogical and technological innovations to the teaching-learning process, with the purpose of making an education in harmony with the various advances of society. It is in an attempt to establish students’ comprehensive training supported in exclusive knowledge or psychometric intelligence that, in the last two decades, require the approach to emotions in accordance with cognitive skills.

Thus, the teachers become not only transmitters of knowledge, but also interactive beings that provide a reciprocal process in the classroom with the intention of promoting comprehensive learning, where the biological, psychological, spiritual and cognitive behavior is addressed as a whole generator of critical citizens and responsible for their actions in the social environment (Araya-Pizarro & Espinoza-Pastén, 2020). In this way, the field of neuroscience has been incorporated into education as pedagogy to design didactic strategies and encourage students’ learning from adequate brain stimulation (Paniagua, 2013).
In this sense, (Vallejo-Valdivieso, et al., 2019) comment that adequate brain stimulation allows the students to promote meaningful learning, being essential for this purpose, to identify the dominant cerebral hemisphere; in this way, it will be possible to establish or design didactic strategies that encourage assertive knowledge and rely on the learning channel theory of neuro-linguistic programming to consolidate brain identification through the visual, auditory or kinesthetic systems. (Marambio, et al., 2019).

(Amaya-Amaya & Cuéllar-Cuéllar, 2016) offer other learning modalities in their research, where they identified styles based on the social and logical, as well as the auditory - physical. This shows that identity is one of the primary functions of the teacher today and as the predominant students' learning style, which not only involves the in-person modality, but also the virtual one. In this sense, curricular planning may be adapted from the criteria of flexibility and educational innovation. In addition, (López-Abella & Juanes-Giraud, 2020), describe the curricular flexibility as:

An approach to interdisciplinary work that obeys an integrative perspective, as a product of an organization that raise the quality of academic work and focus education on learning forms and methods of thought and research (p. 196).

Neurodidactics must be used from an interdisciplinary view of the curriculum in order to promote significant learning from educational innovation. For this reason, the teachers must go beyond their abilities, with the aim of working from a holistic epistemic vision of ancestral and scientific knowledge related to an integral didactics in hand with the social transformations conceived for a sustainable world (Collado-Ruano, 2017). In synthesis, neurodidactics constitutes a tool that enables meaningful learning, due to the integrality of an education based on the generation of changes that is based not only on cognitive, but also, on the students’ self-discovery of abilities, skills competences and emotions. Due to the above, the article aims to analyze how neurodidactics influences the upper basic education student’s meaningful learning in the province of Manabí - Ecuador.
METHOD
The research was developed from the quantitative approach. Methodologically, it was based on a descriptive correlational study of Pearson with a non-experimental field design, which allowed analyzing the relationship between the influences of the independent variable on the dependent variable.

The population sample consisted of 179 teachers from fiscal institutions of upper basic education in the province of Manabí - Ecuador, to whom a simple random sample was applied, using an online survey technique via whatsapp and email. The instrument consisted of a questionnaire of 27 items with five alternative responses on the Likert scale, which was validated through the judgment of three experts. With respect to the reliability, a pilot test was applied to a population of 10 teachers similar to the sample. The result of the Cronbach’s alpha was 0.89, which means that it was acceptable for its application.

The collected data were statistically processed through the statistical SPSS Statistics V25 program. Then bivariate Pearson correlation was calculated, thus establishing whether one variable influences the other. On the other hand, to establish the correlation range, the scale proposed by (Hernández, et al., 2010, p. 312) was used, which is exposed below:

**Interpretation:** Pearson's r coefficient can vary from −1.00 to +1.00, where:
- −1.00 = perfect negative correlation. ("A greater X, less Y", proportionally. That is, each time X increases by one unit, Y always decreases by a constant amount.)
- This also applies "the smaller X, the greater Y".
- −0.90 = Very strong negative correlation.
- −0.75 = Considerable negative correlation.
- −0.50 = Mean negative correlation.
- −0.25 = Weak negative correlation.
–0.10 = Very weak negative correlation.
0.00 = There is no correlation between the variables.
+0.10 = Very weak positive correlation.
+0.25 = Weak positive correlation.
–0.10 = Very weak negative correlation.
0.00 = There is no correlation between the variables.
+0.10 = Very weak positive correlation.
+0.25 = Weak positive correlation.
+0.50 = Mean positive correlation.
+0.75 = Considerable positive correlation.
+0.90 = Very strong positive correlation.
+1.00 = Perfect positive correlation. ("A greater X, greater Y" or "a smaller X, less Y", proportionally. Each time X increases, Y always increases a constant amount).

RESULTS
In consideration of the statistical analysis of the information collected, the following results are presented:

Table 1. Relationship between neurodidactics and meaningful learning.

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Neuro</th>
<th>Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson's correlation</td>
<td>1</td>
<td>0.091</td>
</tr>
<tr>
<td>Sig. (bilateral)</td>
<td></td>
<td>0.223</td>
</tr>
<tr>
<td>N</td>
<td>179</td>
<td>179</td>
</tr>
</tbody>
</table>
The correlation is 0.091, which is cataloged as a very weak positive correlation. Also, the bilateral significance is higher than 0.05, which indicates that the affirmative hypothesis is rejected and the null hypothesis is accepted. In conclusion, neurodidactics influences meaningful learning; however, it must be refined or improved to raise the correlation value and enhance the bilateral significance below 0.05.

**DISCUSSION**

The results projects neurodidactics as a facilitator of meaningful learning, agreeing with the results shown by (Benavidez & Flores, 2019), who indicate that when the teachers apply didactic strategies based on neurodidactics, the students have a greater possibility of learning, since it offers a favorable emotional environment in the classroom that generates an assertive approach to emotions as indicated by (Araya-Pizarro & Espinoza-Pastén, 2020), favoring an integral growth of the actors involved.

In that order, due to the low positive correlation, the application of neurodidactics as a didactic strategy must be perfected. This implies keeping in mind the recommendation of (Paniagua, 2013), who proposes the use of strategies that strengthen the learning channels of the students; in addition, (Ramos-García & San-Andrés, 2019) consider that neurodidactics must be reinforced to enhance emotional competencies and promote an organizational climate in the educational field that offers the possibility of innovating and stimulating the students’ learning.

According to (Zaragoza-Ramos, et al., 2016), didactic strategies may be designed in terms of games, which involve the visual, auditory and kinesthetic channels to promote learning (Marambio, et al. , 2019). Based on this, the teacher will be able to carry out demonstrations related to certain activities and the student will be able to visualize, listen, as well as construct the requested object; in this way, an adequate encouragement of both hemispheres of the brain may be stimulated (Vallejo -Valdivieso, et al., 2019), enabling the generation of meaningful learning.
Meaningful learning focused on the constructivist approach, contributes to employing various strategies to maintain the active subjects in the construction of their knowledge (Carranza-Alcántar, 2017). This enables the applicability of a flexible and interdisciplinary curriculum founded on neurodidactics taking into account the contribution of various disciplines and even pedagogical conceptions connected with active learning (López-Abella & Juanes-Giraud, 2020).

Due to the knowledge society, (Agra, et al., 2019) consider that meaningful learning is in full force, since it allows establishing a connection between the students and their social environment to build lasting knowledge over time. It is related to the learning styles proposed by (Amaya-Amaya & Cuéllar-Cuéllar, 2016), who establish a social-logical learning, in this sense, the need to connect educational planning with social activities encourage a greater motivation to learn.

Education moves towards the consolidation of a model centered on the students as active generators of their learning, in this order, the teachers become the advisors or mediators to promote, as effectively as possible, the achievement of technological knowledge from ICT, being essential to have neurodidactic strategies to learn significantly in virtuality (Vélez-Loor, et al., 2020).

The present and future education is not only founded in neurodidactics, but also in ICT. Therefore, virtuality must be promoted permanently in order to achieve significant learning in the context of the global - social reality, which should be as mentioned above, centered on the student and not on the teacher (Burgos-Briones, et al., 2019).

Continuing with the relevance of virtual education, (Toca-Torres & Carrillo-Rodríguez, 2019) warn about the importance of using multi-user virtual learning environments, which become a complex network of knowledge based on the collaborative - cooperative construction of the users. For this, it is required to put into practice skills of graphic design, innovation, scenario creation, script and computer programming with the
help of multidisciplinary experts that help to stimulate both brain hemispheres, encouraging students’ favorable emotions that lead to significant learning. In this sense, the following result is highlighted:

**Virtual learning environment**

Virtual learning is conceived from its epistemic conception, while virtual reality constitutes the opportunity to create learning in consonance with stimulating the subjects in their entirety. In this sense, neuro-education plays a fundamental role to stimulate knowledge through neurodidactics in order to establish a critical, complex, and integral conception of the students in relation to the social world that surrounds them. Therefore, education must be exercised to favor emotional competences and achieve meaningful learning based on the postulates of virtual education.

**CONCLUSION**

The affirmative hypothesis is rejected and the null hypothesis is accepted, as a result, neurodidactics influences meaningful learning, however, it must be refined or perfected in its application to raise the correlation value and enhance the probability that bilateral significance may generate, that is, less than 0.05. However, neurodidactics is projected as a favorable and excellent influence to promote meaningful learning.

Meaningful learning based on the constructivist approach, contributes to employing various strategies based on the premise of the active subjects and in the construction of their knowledge.

The didactic strategies may be designed focused on games, which involve the student learning in terms of interrelating the visual, auditory and kinesthetic channels, as well as virtual reality. In this sense, the integrality of the subjects involves their emotions and their social-logical learning style to help them accomplish meaningful knowledge.
FINANCING
Non-monetary.

ACKNOWLEDGEMENTS
Thanks to the Pontifical Catholic University of Ecuador, Manabí Headquarters; for motivating the development of this research.

REFERENCES


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