

Construction of multidisciplinary knowledge and development of socio-emotional skills for meaningful learning in university students: “A methodology to support the teacher in the development of this activity”

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Abstract— *The purpose of this article is to show the methodology of a tool for the construction of significant multidisciplinary knowledge, emphasizing the strengthening of socio-emotional skills. We will begin by addressing concepts, the paradigm of constructivism and social constructivism as the basis of the proposed methodology, the differences between the approaches of traditional educational models, critical theory and constructivism. Followed by the methodology, its requirements, results and we will reflect on the results obtained and finally conclusions.*

Keywords— *Meaningful learning, knowledge construction, socio-emotional skills.*

I. INTRODUCTION

This methodology as a teaching resource has the purpose of generating significant multidisciplinary learning. In addition, strengthen socio-emotional skills, contributing to the training of more competitive students, which allows them to empower themselves as leaders to solve problems and to generate proposals for improvement in their areas of training and life.

The proposal includes pedagogical techniques based on constructivism and socio-constructivism. Vygotsky and Jean Piaget postulated that knowledge is constructed by each subject and will not only be the result of an acquisition of responses.

Constructivism is one of the theories that tries to explain the nature of human knowledge and assumes that nothing comes from nothing, which means that previous knowledge gives rise to new knowledge by incorporating previous experiences into their own mental structures; In this way, knowledge is neither passive nor objective (Benítez, 2023), but on the contrary, it is subjective and dynamic, so each person constantly modifies their knowledge networks.

Social constructivism is based on constructivism. For Lev Vygotsky, knowledge is a process of interaction between the subject and the environment, the environment is understood as something social and cultural, not just physical (Castellaro, 2020). In this way, when referring to socio-constructivism we are talking about peer tutoring,

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understanding tutoring as the accompaniment of the teacher to the student in a multidisciplinary interactive situation between peers where the students are university students but the difference refers to the level of competencies of each one. of the degrees.

The methodology to generate multidisciplinary knowledge is a very useful tool to motivate students to develop skills such as information search, analysis, teamwork, effective and assertive communication, leadership, etc. Currently, employers require that new professionals be prepared not only in training knowledge, but also in the development of socio-emotional skills. These skills will allow them to be competitive and decisive so that they can generate proposals to address the problems and needs of a globalized world. Higher education institutions are committed to taking actions to respond to these professional needs that are not acquired entirely within the school; Students, in turn, will have to look for options and be self-taught to continue developing them.

The construction of knowledge is a methodological proposal that contributes to the development of hard and soft skills in a multidisciplinary manner in addition to contributing to the development of skills that guide them to achieve goals and objectives. By implementing the methodology of this tool, traditional paradigms of students, accustomed to receiving information and applying it in their training areas by repetition, are broken, developing very little the skills required to be more competitive. The construction of multidisciplinary knowledge fosters the ability to investigate, analyze, integrate and construct new knowledge to apply it in their area of training to act competently and skillfully in solving problems in different situations of professional life and its environment. In addition to promoting healthy behaviors with other professionals, this allows the appropriation of knowledge to solve multidisciplinary problems and make decisions.

Rigney (1978), cited by Araya (2014), mentions the need to develop cognitive skills that are understood as operations and procedures that the student can use to acquire, retain and recover different types of knowledge and the execution of representation capabilities (reading, images, speaking, writing and drawing), selection capacities (attention and intention) and self-direction capacities (self-programming and self-control).

Melton mentioned by Roediger (2022), refers to three stages in the learning and memory process: encoding,

storage and recovery; The first is the initial learning of information, it is perceiving and learning from the information received. This may seem a bold, even strange statement, since coding in the structures of the nervous system makes new impressions and in the process these structures are associated with experiences or memories and each involves biochemical changes in the brain and its neural tissue creating engrams (subtle memory) in a consolidation process that after learning creates the memory trace of an experience. Recovery is evoked with the strong emotional memory that leaves a permanent mark.

Curiosity and a pleasant environment strengthen interest, creativity and collaborative work, the result of these tools will provide a consolidation that evokes knowledge and the development of representation skills in students (reading, images, speaking, writing and drawing). , selection capabilities (attention and intention) and self-direction capabilities (self-programming and self-control). During the development of this tool, the teacher strengthens self-control and memory tools to consolidate their knowledge.

Steps to follow prior to the methodology.

- A) During the first stage, the development of the activity is explained to generate interest in the student to participate. The student does not necessarily have to have developed cognitive and socio-emotional skills since during their participation they will be developing them; In parallel, the topic will be explained with its axes to be developed, specifying the incorporation of students from other careers to integrate their knowledge to analyze the problem in a multidisciplinary way and generate options for the resolution of the thematic problematization presented. Once the students who will participate have been identified, the second stage of the methodology is applied to develop the activity.
- B) Prepare a Gantt chart to comply with established times and development of the assigned topic, including review dates to direct the progress of the work; In addition, observe the development of skills according to Bloom, who indicates in his taxonomy that they can be classified as basic to build higher skills as recommended in the following list:

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1. Remember and search for information in different sources and media, include advanced search (search engines).
2. Read and understand the information, marking the most important.

Low levels generate anxiety, sleep disturbances, mania and panic attacks.

- 5) Adrenaline: they increase alertness and in a chronic state can contribute to depressive stages. Ibarrola, B. (2014).

Superior skills:

1. Analyze, link and recombine by building a tool, for example, a mental map to consolidate super-structured learning, which begins when information is received in the cerebral cortex. This establishes an operational and functional memory for immediate use, and after a few seconds a long-term memory, with the encoding of the information graphically represented in a creative way, supported and organized as a mental or conceptual map.
2. Comment, reflect, moderate and work collaboratively.
3. Once the organization of how work will be carried out is completed, schedule the meeting with your academic peers to integrate and reach a consensus on the information, concluding with a presentation with sequence, analysis, integration of information and construction of knowledge.

Brain function will depend on the way concepts have been linked in the hippocampus and medial temporal lobes; which confirms the need to help the student to constitute a hologrammatic and systemic mental model from the cognitive process itself, which establishes coherent relationships between concepts and the graphic form to represent them; and that generates interest so that it builds super learning actively and retroactively (Díaz and Pulecio, 2015)

Type of study: Descriptive, with a mixed research approach with theoretical support and teaching method.

Goals

General objective: Train teachers to apply the multidisciplinary knowledge construction methodology as a teaching resource for meaningful learning, contributing to the development of soft skills to train students who contribute to problem solving, forming leaders in their areas of training.

Particular objectives

Invite teachers to apply the multidisciplinary knowledge construction methodology.

Consolidate a multidisciplinary team of teachers who integrate this methodology into their study programs for meaningful learning in their students.

Train students with skills for autonomous learning and leaders in their areas of training.

Generate networks of academic collaboration between participating institutions.

When applying the knowledge construction methodology, a diagnosis of the students' learning styles must be carried out, which must include the identification of the study technique (s) that have been developed, subsequently they must be recorded. the data in a table and after analysis take the direction of your attention accordingly.

It is important to mention that at the brain level the cortex and the limbic system are involved in learning; Furthermore, the right hemisphere processes visual information, and the left hemisphere processes verbal information, not to mention that the ability to remember images is greater than that of retaining words. Finally, the main neurotransmitters in this learning process are:

- 1) Acetylcholine: regulates the ability to retain information, store it and retrieve it, regulating the learning capacity.
- 2) Dopamine: is related to good humor, spirit of initiative and motivation; Low levels are related to depression, hyperactivity, lack of motivation or depression.
- 3) Serotonin: produce calm, patience, self-control, sociability, adaptability and stable mood; Low levels produce hyperactivity, aggressiveness, impulsivity, mood disorders, irritability, anxiety, insomnia, depression, migraines and bulimia.
- 4) Gamma-aminobutyric acid: more abundant, helps memorization and promotes relaxation;

Identification of the participating student			
Student's name	Learning style	Study technique	He likes to work on:
	1 auditory 2 visual 3 kinesthetic	1 underline 2 make notes 3 study sheets 4 take a test 5 make mind maps	1 team 2 single
Nájera Pérez Luz	2	3	1

Table No.1: Shows the characteristics of the student to acquire knowledge, identifying those who require more directed work during the development of the activity.

Source: self made.

II. METHODOLOGY

- 1.The teacher explains the development of the activity to generate the student's interest and want to participate
- 2.Establish the theme with its axes to be developed flexibly, allowing the incorporation of students from other degrees.
3. Analyze the way students acquire knowledge (fill out registration table No.1), reviewing their study techniques, learning style and collaborative work.

4. Form work teams with characteristics analyzed previously and due to the complexity of the thematic axis.
5. Create a Gantt chart to establish advice during the development of activities such as: Information search, analysis, iconic integrations and collaborative work for compliance in a timely manner with the assigned axis.

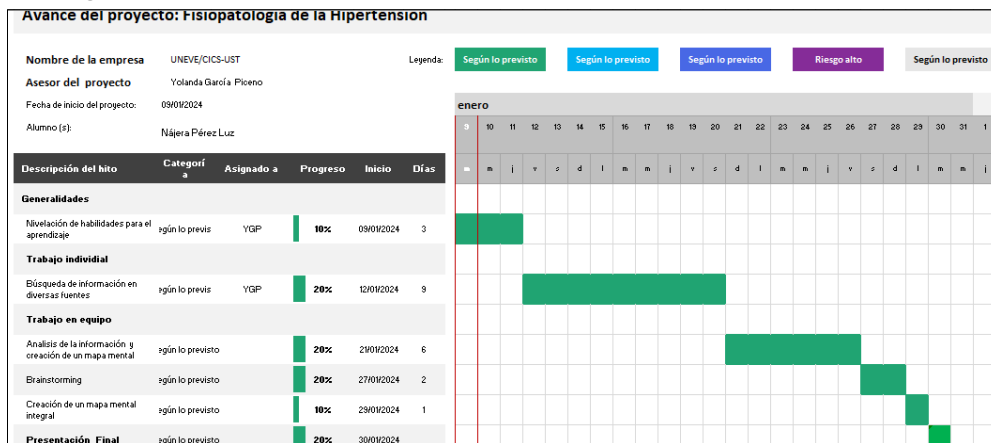


Table No.2: An organization of activities and times is observed, Gantt diagram

6. Review the prepared material and make a preliminary presentation of the work.



7.Final

presentation. Observe the

multidisciplinary integration of the main topic, identifying the development of basic cognitive skills to build higher ones, as we see in the following rubric.

In this checklist the development of basic cognitive skills will be observed to build superior skills as seen in the following list (Hernán, 2009) as listed below:

1. Remember and search for information in different sources and media, include advanced search (search engines).
2. Read and understand the information, marking the most important.

During the development of basic skills we will observe the development of higher skills such as: active and meaningful learning in deference to teaching focused on thinking, methods and procedures that contribute to the development of students' abilities and skills (Schmidt, 2006)

1. Improve your language and discursive ability.
2. A notable improvement is observed in reading and writing skills.
3. Make inferences and classifications
4. Exercise, organize and deepen your level of thinking.
5. Improves your teamwork.
6. Visualize problem-solving alternatives in a multidisciplinary way.

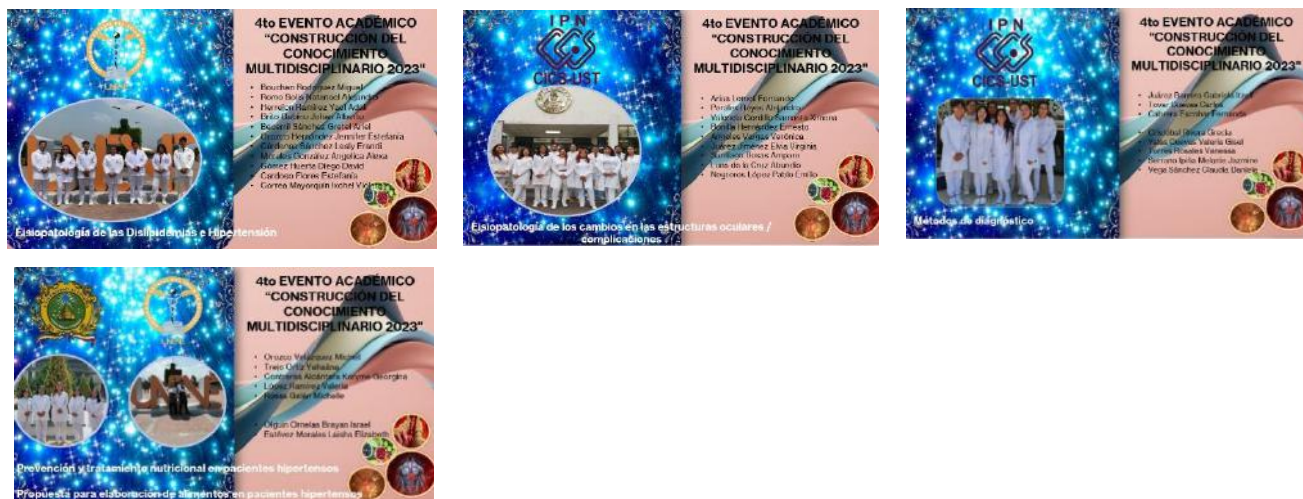
III. RESULTS

The event was named “ 4th Academic Knowledge Construction Event: Hypertension and Triglycerides”, being hosted by the Interdisciplinary Center for Health Sciences, Santo Tomás IPN Unit.

During the application of the methodology, 8 teachers were integrated who coordinated the activities of the participating students; Of these we have 8 students from the degree in acupuncture, 2 from the degree in nutritional gastronomy from the State University of Valle de Ecatepec, 15 students from the degree in Optometry from the Interdisciplinary Center of Health Sciences unit Santo Tomás of the IPN and 4 students of the bachelor's degree in nutrition at the Autonomous University of the State of Mexico, Acolman campus.

It is important to mention that the students who participated are from several semesters, from the second to the seventh semester. The selected topic was hypertension and triglycerides with the thematic axes, pathophysiology of metabolic diseases, organic and systemic alterations, ocular manifestations, diagnostic methods, preventive nutritional treatment, support and food preparation to control the complications of these pathologies.

In the following evidence, participating students and their thematic axis are observed.



The participation of each of the students during the academic event allowed them to observe the enrichment in their knowledge, which generated security, empowerment and leadership and confidence when making their presentation with a multidisciplinary approach in favor of a health problem.

The development of leadership and leadership skills in the participants is seen in the previous graph; 18% adequately resolved the assigned activities, observing appropriate collaborative work, objectivity, empathy, active listening and assertive communication, because the type of leadership developed in these students is

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democratic. In the remaining 82% it was observed that they had difficulties in decision making, assertive communication and active listening. These aspects must be strengthened to achieve better organization and fulfillment of the activity in a timely manner. In addition, cleanliness and organization were observed during the development of their activities, strengthening discipline as part of their academic training.

The result of the organization carried out by the students themselves in coordination with a teacher received 300 attendees who at the end of the event showed their satisfaction with the shared theme, the organization and logistics of the work.



Academic event link

[4th academic event on Knowledge Construction: Hypertension and Triglycerides \(youtube.com\)](https://www.youtube.com/watch?v=...)

IV. CONCLUSION

Education in higher education institutions seeks to enhance the knowledge of its students, noticeably changing the way of teaching and acting as observed by the professors who participated applying this methodology where the acquisition of knowledge was transformed from a passive to an active way. There is constant talk of a comprehensive education that, in addition to the cognitive, students develop skills that allow them to attend to their daily lives with logical, critical, decisive and creative criteria, as we observe in the students at the moment in which they present their analysis and proposals, the way in which they answer questions, the organization with their colleagues and the resolution of problems during the event.

The integration of multidisciplinary knowledge opens up a broader panorama of how to care for or deal with the health problems that arise in the Mexican population. In addition, working in a multidisciplinary manner to make proposals for prevention, diagnosis and guidance of the different comprehensive treatment proposals to improve the quality of life of patients.

The teachers who participated in the application of the multidisciplinary knowledge construction methodology become agents sowing pedagogical strategies for meaningful learning and the development of socio-emotional skills. The methodology encourages a transformation of the teacher's didactics by applying

several key strategies to promote meaningful learning based on problem solving; In addition, the strengthening of socio-emotional skills has made it easier for students to work collaboratively inside and outside the classroom, improving close communication between participants, promoting trust, interpersonal relationships and the generation of multidisciplinary knowledge as another option for the Problem resolution.

REFERENCES

- [1] Álvarez, CJD, & León, CP (2016). MODELS, MENTAL MAPS AND LEARNING STYLES: APPROACH FROM COGNITIVE NEUROSCIENCE. *International Engineering Education Meeting*.
- [2] Araya-Ramírez, J. (2014). The use of the didactic sequence in Higher Education. *Education Magazine*, 38 (1), 69-84.
- [3] Benítez-Vargas, B. (2023). Constructivism. *Con-Science Scientific Bulletin of the Preparatory School No. 3*, 10 (19), 65-66.
- [4] Bernal González, MDC, & Martínez Dueñas, MS (2009). Active methodologies for teaching and learning. *OPENAIRE*.
- [5] Castellaro, Mariano, & Peralta, Nadia Soledad. (2020). Thinking about school knowledge from socioconstructivism: interaction, construction and context. *Educational Profiles*, 42 (168), 140-156. Epub March 9, 2021. <https://doi.org/10.22201/iisue.24486167e.2020.168.59439>
- [6] Covarrubias Papahiu, P., & Martínez Estrada, CC (2007). Representations of university students about meaningful

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learning and the conditions that favor it. *Educational Profiles*, 29 (115), 49-71.

- [7] Díaz Álvarez, CJ, & Pulecio León, C. (2016). MODELS, MENTAL MAPS AND LEARNING STYLES: APPROACH FROM COGNITIVE NEUROSCIENCE. *International Engineering Education Meeting* . <https://doi.org/10.26507/ponencia.909>
- [8] Hernán-Losada, I. (2009). Conclusions on the application of Bloom's Taxonomy to the design of pedagogical tools.
- [9] Ibarrola, B. (2014). *Exciting learning: neuroscience for the classroom* (Vol. 5). SM Spain Editions.
- [10] Schmidt, S. (2006). Competencies, cognitive abilities, practical skills and attitudes definitions and development. Retrieved on , 19 .
- [11] Roediger III, HL, Juntos, PIA, and Memoria, IY What perspective focuses on how we encode, process, store and retrieve information?