





Código: CA-02	CA-02 LEARNING RUBRIC AND LEARNING EXPERIENCE LESSON PLAN 2024	
Versión: 1		
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PROJECT'S NAME: 3D Cellular Exploration: Virtual Journey to Microscopic Life.		
LEVEL: 9th grade.	CLASS: A-B	TEACHER: Silvia Fernanda Rodríguez López.
<p style="text-align: center;">PERIOD I</p> <p>FROM: January 17th 2024</p> <p>TO: April 19th 2024</p>	<p>KEY SKILLS: Interacting with the natural environments through exploration exercises for analyzing and making a proposal to possible solutions using ICT tools.</p> <p>STANDARD KNOWLEDGES: Understand the genetic information derived from the meiosis cell division process, contained in a DNA molecule, allows the conservation of the biological physical characteristics of any given species and as well as capacity for variation.</p>	
<p>¿WHICH ARE THE COMPREHENSIVE SKILLS WE WANT THE STUDENTS HAVE?</p> <p>Explain the mitosis and meiosis process and its importance in the genetic variability of the species.</p> <p>Explore the previous ideas about DNA.</p> <p>Recognize how the genetic information is stored inside the DNA, the RNA function and the central biology dogma: replication, transcription and translation.</p> <p>Design, build and explain the DNA model and its implications in the evolution of science (location of some mutant genes and their</p>	 <p>CB5.</p> <p>¿WHAT TO LEARN FROM THE TERESIAN SKILLS?</p> <p>Conceptual: DNA, hereditary material (replication, transcription and translation), cell division (mitosis and meiosis), genetic mutation, and gene expression in the evolution process.</p> <p>Procedural: Develop the students' ability to apply and integrate genetic concepts through</p>	<p>¿WHICH IS THE SCENERY OR PROBLEMATIC SITUATION?</p> <p>This year there is the second version of the Teresian Science congress, that's why we want to take another chance to keep promoting the essential and environmental values like, respect, austerity, solidarity, co-responsibility, empathy and coherence to be better living things and find some solutions to protect and take care of our planet from our own environmental relationship.</p>

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expression).	practical laboratory experiences, guides, 3D modeling, and readings. Attitudinal: The student develops positive attitudes such as curiosity, participation, collaboration, and respect in the classroom.	
STUDENT'S ROLE: genetic explorer.		
CHALLENGE: ¡Become a DNA genius!! Create a 3D model that creatively represents the structure of life.	PRODUCT: 3D modeling, using applications like TinkerCad or Scratch, to represent the process of cell division (mitosis and meiosis), replication, transcription, and translation of genetic material.	PROMOTION: Publishing the models through platforms and sharing them with classmates.

LEARNING OUTCOMES			
SUPERIOR (S)	ACCURATE (A)	AVERAGE (B)	LOW (J)
The student structures and argues from the creation of a 3D DNA model the fundamental concepts such as cell division, replication, transcription, and translation of hereditary material, as well as gene expression and its relationship with evolutionary processes. Additionally, they take an active role in research, practical activities, reading exercises, and communication skills.	The student develops, through the creation of a 3D model of DNA, the fundamental concepts such as cell division, replication, transcription, and translation of hereditary material, as well as gene expression and its relationship with evolutionary processes. Additionally, they take on a consulting role, integrate practical activities, and develop communication skills.	The student defines, through the creation of a 3D model of DNA, the fundamental concepts such as cell division, replication, transcription, and translation of hereditary material, as well as gene expression and its relationship with evolutionary processes. Additionally, they highlight some practical, communicative, and consulting skills in the classroom.	The student demonstrates difficulty with fundamental concepts such as DNA, cell division, replication, transcription, and translation of hereditary material, and doesn't develop the final product. Additionally, they need to improve their attitude and enhance their practical, communicative, and interpersonal skills with others.

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LEARNING EXPERIENCE

STAGE 1: Deciphering the Genetic Code: Journey into the DNA.

EXECUTION: From cycle 1 to cycle 3.


CRITERIUM: Define DNA as the hereditary material of organisms, explaining its fundamental components, and interpreting its function in organisms.

TASKS: Development of diagnosis, identification of previous ideas, and presentation of the area project.

- The students participate in a diagnostic activity on reproduction, where they, along with their peers, construct a truth and a myth about the types of reproduction and their components in various groups of organisms (plants, fungi, animals, and bacteria). Additionally, they develop a mind map that relates the nervous system, endocrine system, and homeostasis. **(Cycle 1) (4 hours).**
- The students provide various questions related to the project: “3D Cellular Exploration: Virtual Journey to Microscopic Life”. The aim is to create a 3D model, using the TinkerCad or Scratch application, to represent the process of cell division (mitosis and meiosis), replication, transcription, and translation of genetic material. The project is carried out in teams. **(Cycle 2) (1 hour).**
- The students relate the concept of hereditary material based on their prior ideas, developing a concept map with connections of the DNA concept, such as its structure, composition, replication, elements of genetic inheritance, and its importance. **(Cycle 2) (1 hour).**
- During this session, students ask questions and take pertinent notes on the topic: genetic material and its composition. **(Cycle 2) (2 hours).**
- The students, following the teacher's instructions, carry out the physical construction of a nucleotide using materials designated beforehand. In this activity, the components of the nucleotide (phosphate, nitrogenous base, and sugar) are specified, along with their differences, and their joining with other nucleotides to form a DNA chain. **(Cycle 3) (2 hours).**
- A practical laboratory focused on DNA is conducted, where students have the opportunity to apply their knowledge and consolidate their understanding of genetic processes. In advance, the teacher provides the students with the laboratory guide and report. **(Cycle 3) (2 hours).**

STAGE 2: Cellular Connections: A Journey through Mitosis and Meiosis.

EXECUTION: From cycle 4 to cycle 7.

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CRITERIUM: The students integrate and develop their knowledge, demonstrating an understanding of the processes of interphase, mitosis, and meiosis through the application of the proposed project and their active participation in class activities.

TASKS: Development of the thematic axis: Mitosis and Meiosis.


- The students take notes and actively participate by asking questions about the process of cell division: interphase (G1, S, and G2) and mitosis (prophase, metaphase, anaphase, telophase, and cytokinesis), through an interactive presentation. **(Cycle 4) (3 hours).**
- According to the above, students in teams create an initial diagram specifying the first phase (interphase), followed by mitosis, integrating each of the concepts previously seen in class. **(Cycle 4 -5) (2 hours).**
- The students take notes and actively participate by asking questions about the second part of the cell division process: meiosis (prophase I, metaphase I, anaphase I, telophase I, prophase II, metaphase II, anaphase II, and telophase II), through an interactive presentation. **(Cycle 5) (3 hours).**
- Following that, the first phase of the project is carried out. Students organize themselves into teams, taking into account the cell division process explained earlier, to create an initial sketch according to their corresponding theme. It is necessary to bring questions on each topic based on what has been covered in class sessions. **(Cycle 6) (2 hours).**
- The students integrate the previous thematic axes through the game “Dividing us”, mitosis and meiosis in action. The teacher gives one or several cards to each pair, with images representing a stage of mitosis or meiosis. Upon identifying the division process, the students record it on paper. Once identified, they seek out other pairs to complete the process. For mitosis, there are 5 cards, and for meiosis, there are 8 cards. **(Cycle 6) (2 hours).**
- The second part of the project (3D modeling) is carried out. Students organize themselves into teams and, considering the initial sketch, clarification, and information explained in class, they proceed with the 3D modeling. It is necessary to complement through inquiries. **(Cycle 7) (4 hours).**

STAGE 3: Weaving the Genetic Thread: Building Deep Understanding of Replication, Transcription, Translation, and Gene Expression.

EXECUTION: From Cycle 8 to cycle 11.

CRITERIUM: At the end of the activities related to genetic information (DNA-RNA), students can coherently structure their knowledge about replication, transcription, and translation. Moreover, they will be able to articulate well-founded arguments about gene expression and genetic changes, demonstrating a deep understanding of genetic processes and their importance in evolution.


TASKS: Development of the thematic axis: hereditary material and project presentation.

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- The students take notes and actively participate by asking questions about the thematic axis of genetic information (DNA-RNA), addressing the processes of replication, transcription, and translation through an interactive presentation. **(Cycle 8) (2 hours).**
- Continuing with the project, the 3D modeling is carried out, focusing on the replication, transcription, and translation of genetic material. Students work in teams, applying the concepts previously learned in a practical manner. **(Cycle 8) (2 hours).**
- According to the DNA model, emphasis is placed on gene expression with mutations. Through problematic axes presented to the students, the aim is to recognize changes in gene expression and understand their implications. **(Cycle 9) (2 hours).**
- Based on explanations from previous classes, students develop a genetic information guide covering topics such as replication, transcription, translation, mutations, and other aspects related to genetic material. This guide will be submitted to the teacher in teams. **(Cycle 9) (1 hour).**
- Reading Assignment (Book: “Domesticados” by Alice Roberts): Students, along with the teacher, conduct an idea center session on the chapter previously read at home: Introduction and “Cápitulo 1: Perro”. Taking into account the following reading parameters: main ideas, unclear concepts, important reflections. **(Cycle 9) (1 hour).**
- The relationship between DNA and evolutionary implications is explored, deepening the understanding of how changes in genetic material can contribute to the evolutionary process. This is done through a documentary selected by the teacher. **(Cycle 10) (2 hours).**
- Reading Task (Book: “Domesticados” by Alice Roberts): Students, along with the teacher, conduct an idea center session on the chapters previously read at home: “Cápitulo 2: Trigo” and “Cápitulo 3: Reses”. Taking into account the following reading parameters: main ideas, unclear concepts, important reflections. **(Cycle 10) (1 hour).**
- Final Presentation of the Project: “3D Cellular Exploration: Virtual Journey to Microscopic Life”. Where students share their results, experiences, and learnings. This includes socialization and allows for project feedback. **(Cycle 10 - 11) (3 hours).**
- The students apply the final assessment in order to demonstrate their argumentative process and other developed skills regarding cell division and hereditary material. **(Cycle 11) (2 hours).**

Note: All notes, activities, guides, and evaluations are compiled in the science portfolio as an integral part of the learning process.

Book: Domesticados by Alice Roberts.

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