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A DIDACTIC PROPOSAL IN THE LEARNING OF ASTRONOMY THROUGH PARADIGMATIC CHANGES

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We are presenting a paper about some work carried out with future teachers of secondary schools specialized in Physics, Astronomy and Mathematics from a teacher's training college in the city of Buenos Aires, Argentina. The objective was to develop pedagogic strategies to shape a critic, scientific teacher through three different situations: work, experiments, and the situation or problematic case. We have chosen three key moments in the development of Astronomy from the historic, social, philosophical, epistemology and scientific perspectives through the following paradigmatic confrontations: The geocentric/heliocentric theory, the great debate of Shapley and Curtis, and the problem of dark matter. For each case we have worked with the didactic model of confrontation and an epistemology which accompanies the significant learning in the construction of models and theories.

The proposed work is situated in the focusing of the cognitive conflict which will be analyzed using the sequential terms: watch, think and ask. For observation we have chosen the spiral galaxies rotation curve. The point of departure is a strange phenomenon which movilices the explanation of the presupposed ideas: the graphics are incompatible with the Keplerian model. Our interest is on the challenge of the supposed topic through an anomaly in the paradigm. We develop a process of investigation through a sequence of questions where the future teachers can produce a questioning in small groups. Challenging the supposed ideas, these will be able to confront and have a critical point of view on a theory. The idea is that they increase the abstraction, the inventive side, producing proofs in an appropriate context, apply criteria and evaluate problematic situations. They find themselves building a research program. What questions rise from the comparison between present or more recent experiences and what is supposed valid? Thinking is to relate what you can see with what you already know about the topic. What are the particular points in their observations? Which points do not make sense? What is that we can watch? The didactic frame is accompanied by an epistemological dimension. The student-future teacher senses that as history goes by theories change, as is the case of the paradigmatic opposites geocentricism/heliocentric. We have used Kuhn model in the construction of the learning using the concept of anomaly. Which means we are building an explanatory scene of a physical which could not be explained by the previous paradigm generating a scientific revolution (the passage from geocentricism to heliocentric)? In this way we try to explain the movement of the planets. But the previous paradigm did not have the same objective? In a second step it is important to produce in the students, the need to find a response to the following questions: Why and have the theories change all along history? Which is the role played by the model? To answer this question we have analyzed the application of the Hudson critic realism clans the epistemology study of the debate between Shapley and Curtis or the problem of the dark matter. The analysis and results of the study of the dark matter agree with the model subject matter of a theory since scientists try to generate discrepancies of reality but they cannot know for sure if they are right. The future teacher acquires skills and criteria when it is a theory or when you are subject to the model of a theory. Which means that facts are established depending on the agreements on the use of the theory? The experimental verification continues to be valid but is not limited to it. The future teachers perceive that the dark matter is not a scientific theory it doesn't refer to a conceptual frame with a somewhat solid degree, it rather has a tentative character, faithful to a theory.

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