# MODEL PROPOSAL TO PROMOTE THE CONSTRUCTION OF THE STRONG MEANING OF VOLATILITY.

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## Abstract

*In this work, we shows a proposed model that favors the construction of the meaning of volatility as a measure of variation within the framework of the subject statistic II, for the administrative sciences, in addition to the methodology for the design and application of activities that focus their purpose on the construction of such meaning with the use of financial data that through simulation with Excel and other tools, are the basis for the development of each of these mediators; these are applied using problem solving by Bransford, J. (1987), realistic math by Freudenthal, H. (2006), meaningful learning by Ausubel, D. (1968), and gamification.*

## THEORETICAL FRAMEWORK.

The model showed that students arrive to build the personal meaning of volatility in an appropriate way, improving their ability to analyze temporal data and make decisions in situations of economic uncertainty , that raises the research question: ¿How to develop and promote statistical thinking, particularly in relation to the issue of volatility, by promoting the construction of the meaning of volatility in students in accounting and economic sciences through computer-aided sim?. The output of the model consists of eight activities planned as follows: "Previous concepts and generalities", "Log-normal distribution", "Simulation" (Brownian motion), "Stock Markets I" (covariance), "Stock Markets II" (regressions and correlations) "Black Scholes I" "Black Scholes II" and "Challenge Your Creativity"

## METHODOLOGY

Because this work is based on mathematical education the methodology used is under a qualitative approach and the theoretical foundations of action-research, since the main objective is to improve the quality of an action, in this case education through robust construction of theoretical and practical meanings.

**Scope of the investigation**

It is intended to promote the construction of robust meaning of the concepts associated with volatility in students and that at the same time they are able to interpret the scientific literature of the topic and thus contribute to their future professional performance.

**Population and Sample**

The study population consisted of students from the Antonio Nariño University in Bogotá Colombia, and the sample consisted of two distinct groups of students from the fourth semester of economic, administrative and accounting sciences who study the statistical subject II, one at Headquarters 1 and one at Headquarters 2. The students at Headquarters 1 are from a course taught from 8 to 10 pm Tuesdays and Thursdays; all are workers who in the evening attend the University; and those at Headquarters 2, are attending a course from 7 to 9 am Tuesdays and Thursdays; Students in this group are younger on average than those in the other headquarters and most are not workers, they only study. The type of sampling is
chosen for convenience, as indicated in Casal (2003).

## Methodology.

### DIDACTIC PROPOSAL

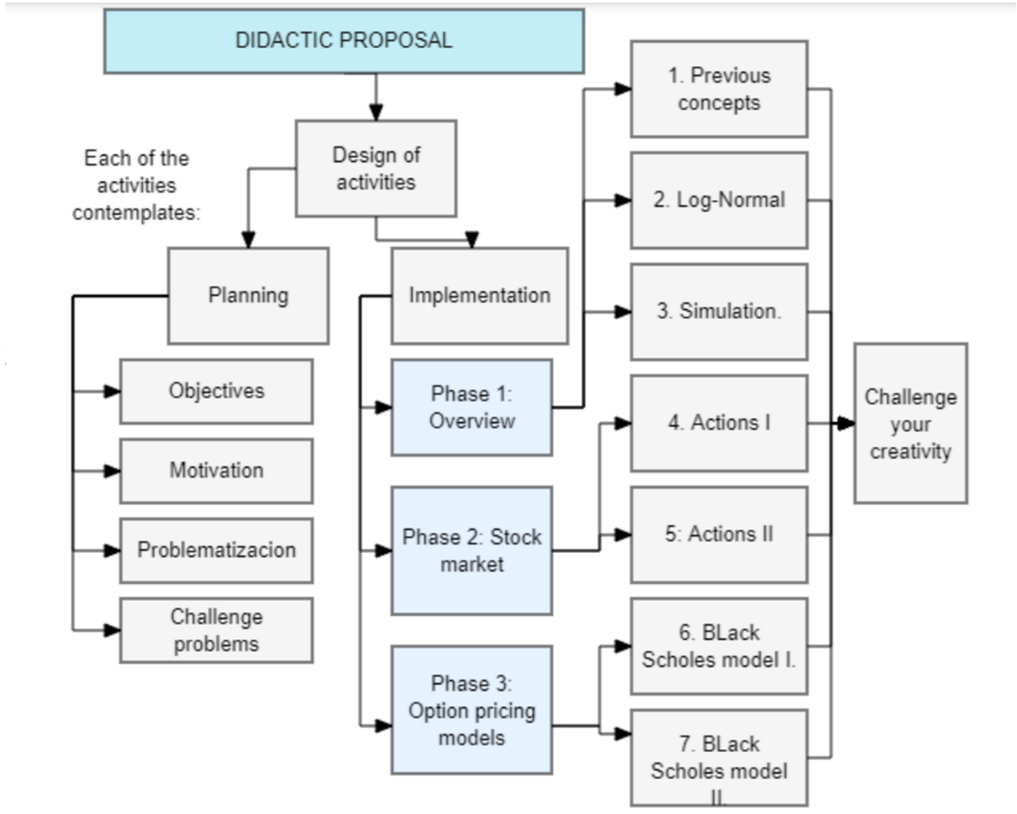
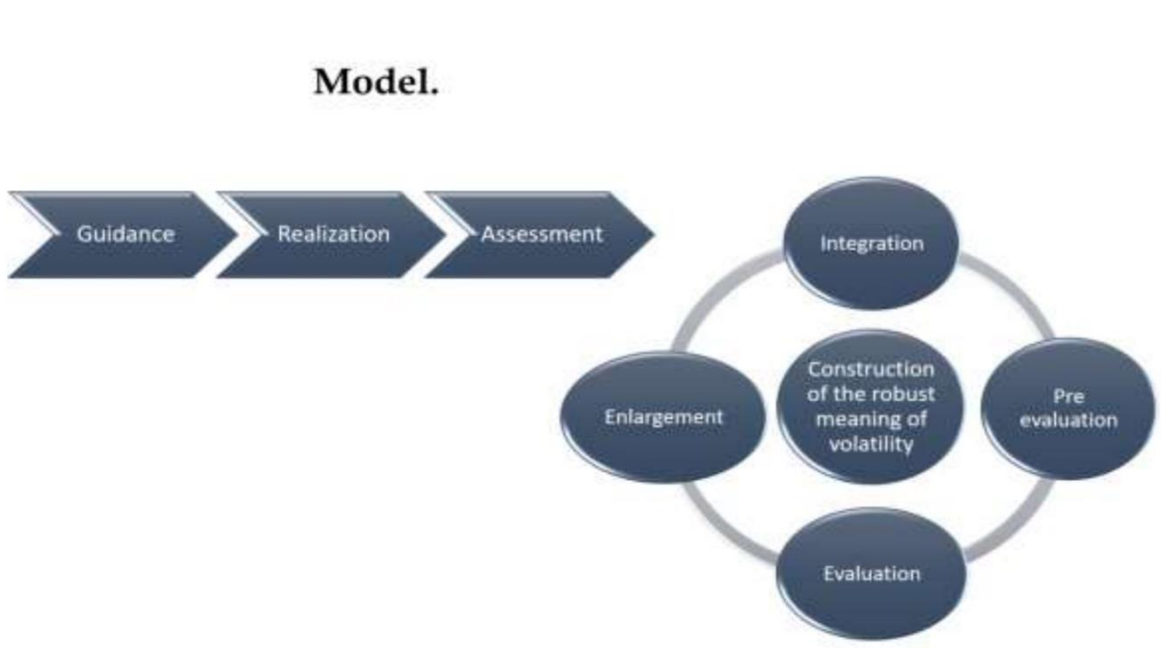



*Illustration 1. General outline of the didactic proposal. Source: Díaz, M. (2020). P. 71.*

### Planning

### Startup




### MODEL PROPOSAL.

This table resume the proposed model phases.

| Planning | | | Execution | | | |
|---|---|---|---|---|---|---|
| Orientation | Concretion | Initial assessment | Integration | Pre evaluation | Extension | Evaluation |
| Theoretical Statistics Psychological and Philosophical | Internal and External Contradiction | Work with students. Work with experts. | Motivation, theoretical references and contents. | Problem solving as a motivating element. | Construction of robust meaning. | Problem solving like a motivating in the stage "Integration" |

Table 1: Summary of the proposed model.

**Validation of proposed model.**

This table summarizes the validation instruments used in the proposed model.

| Statistics methods | | Qualitative methods | |
|---|---|---|---|
| Wilcoxon test. | Factorial analysis of perception test | Construction elements proposed by Godino | Video analysis proposed by Planas. |

Table 2: Summary of the validation of proposed model.

### Statistics Methods

1. Wilcoxon test (1970),For the analysis of input and output tests,
2. Auzmendi (1992), For the analysis of attitudes towards statistics and volatility.

### Qualitative Methods

1. Godino (2002). For analysis of the elements of meaning
2. Planas (2006), For the analysis of the videos of each session.

## CONCLUSIONS AND RECOMMENDATIONS

It is identified that the use of technology in its teaching is no longer a trend, it is a necessity. The incorporation of the computer in the classroom for undergraduate students is not a novelty, it is part of its nature; teachers must adapt to these new social and pedagogical trends.

The concepts dealt with in the statistical classroom must be related to the daily life of the future professional. For this purpose, teachers who teach such subjects must know and go a step beyond the old class structure of the behavioral school of form: "Axiom, Theorem, Demonstration and Example"; in order to go further, it must be involved in a way close to the student and his conceptions, in this way it can be oriented from his beliefs; for that reason, the constructed meanings will be significant.

With the research a change in the attitude of students towards statistics is achieved particularly in the
subject of volatility, this is evident in the analysis of the perception and satisfaction survey, it shows the importance they give to statistics and the change in the face of their beliefs about the subject at the beginning of the academic period.

This new vision of the student in relation to statistics is absolutely consistent with the theoretical framework of research where the effect of gamification in the classroom, realistic mathematics and problem solving is positively related; faced with a negative attitude at the beginning of the course.

The research was able to demonstrate that the application of the didactic proposal presents a robust construction of the meaning of volatility that generates positive changes towards statistics and their application in finance.

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