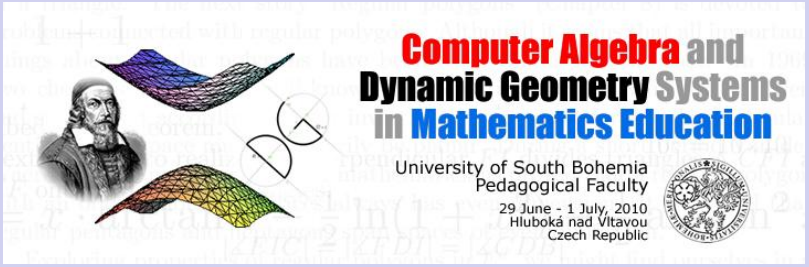
Pontifical Catholic University of São Paulo - PUCSP
PostGraduate Program in Mathematics Education - EDMAT

Aggregation of a Comparative Non-Parametric Statistics to Didactic Engineering



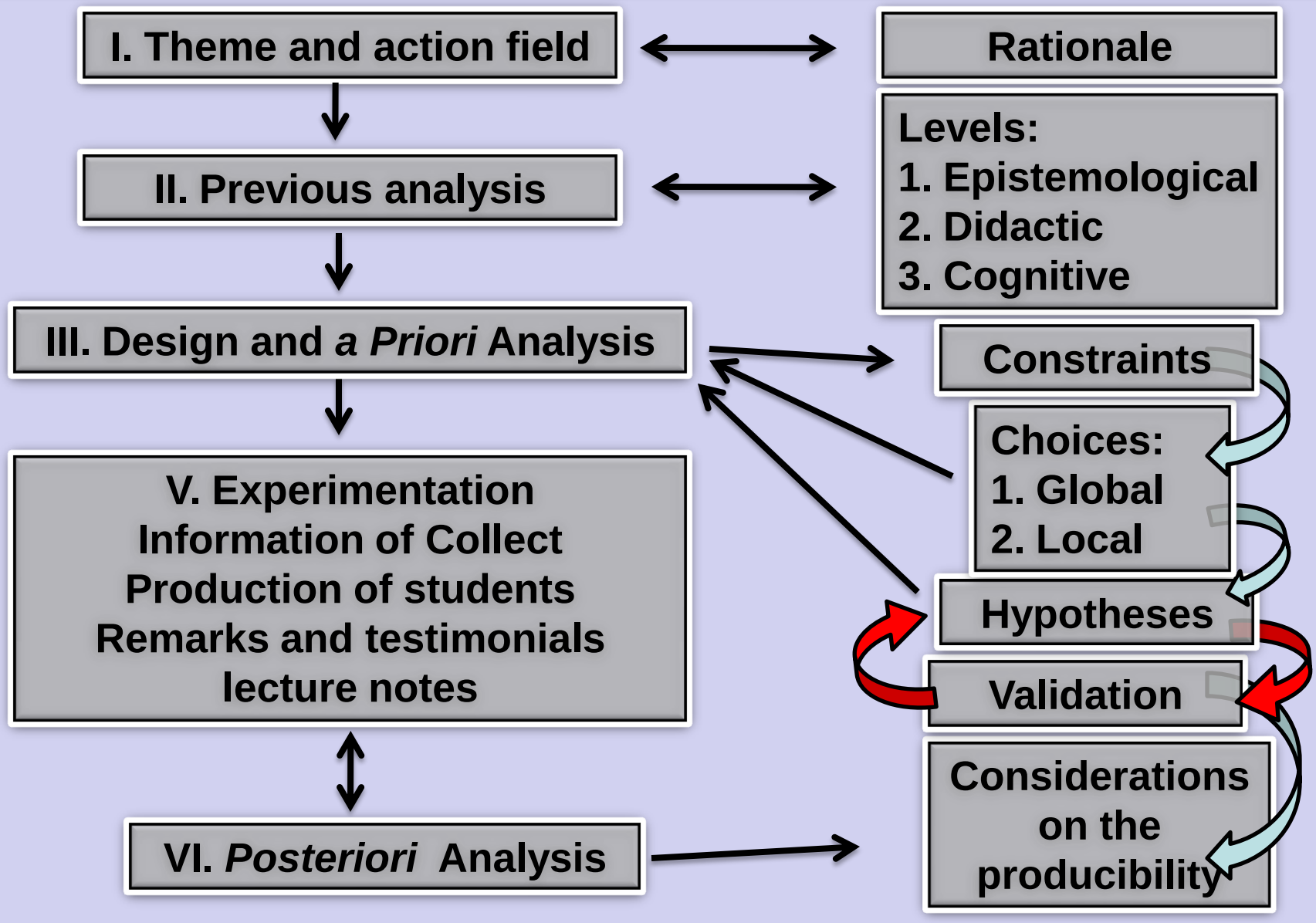
Celina A. A. P. Abar
José Miguel Bezerra Filho
Péricles César de Araújo
Sonia Barbosa Camargo Igliori

Aggregation of a Comparative Non-Parametric Statistics to Didactic Engineering

The Engineering Didactic rejects the characteristics of classical statistics such as:

- *Parametric analysis;*
- *The case control or experimental groups;*
- *Control groups.*
- *We believe there's arguing about such a rejection.*

Classic Map of the Engineering Didatic



Aggregation of a Comparative Non-Parametric Statistics to Didactic Engineering

Why to present an alternative analysis to the data processing in Engineering Didactic?

- *Engineering Didactic is based on an analysis conducted a Priori and other Posteriori.*
- *Its method of validation is internal.*
- *The use of an appropriate quantitative method can increase the reliability of results.*

Aggregation of a Comparative Non-Parametric Statistics to Didactic Engineering

The use of an appropriate quantitative method is an alternative for the use of nonparametric statistical tests.

- *Thus we do not need a model population, and many assumptions or accurate.*
- *This treatment gives Didactic Engineering, characteristics that meet the prerogative of falsifiability of Popper's scientific method.*

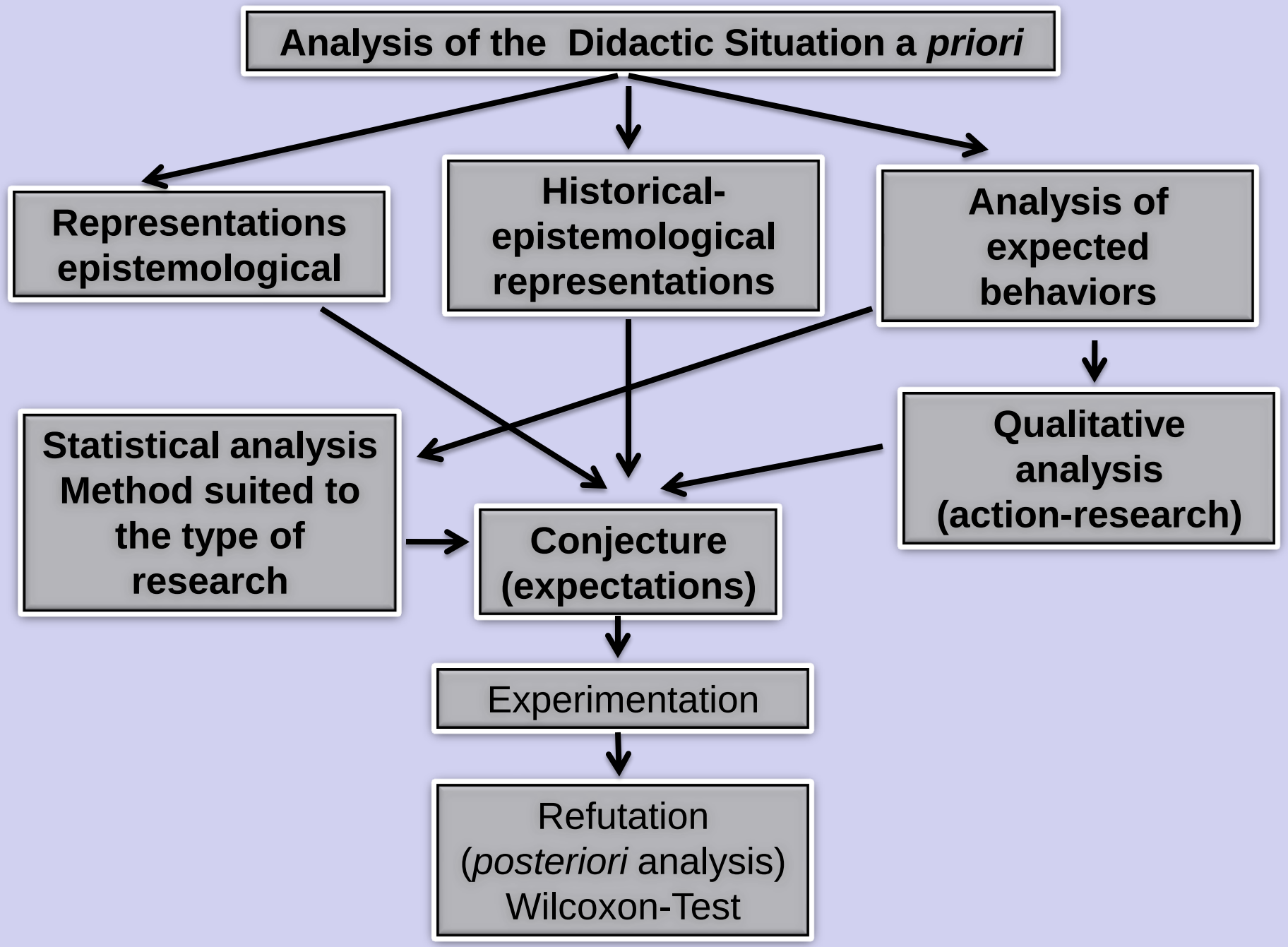
Aggregation of a Comparative Non-Parametric Statistics to Didactic Engineering

The use of an appropriate quantitative method is an alternative for the use of nonparametric statistical tests.

- *The Popper's scientific method: the scientific validation happens by conjectures (the result of a priori analysis of the experimental phase) and refutetions (the result of a posteriori analysis)*

We propose the addition of the a statistical test non-parametric in the didactic engineering (Wilcoxon-Test).

- *The Wilcoxon test allows the rejection of the hypothesis and agrees with the prerogative of the falsifiability of the scientific method;*
- *The criterion of Popper: the status of a scientific theory is falsifiability or testability.*
- *Thus, we will build from the Didactic Engineering, an efficient method for the treatment of small samples.*


Analysis of the Didactic Situation a *priori*
Representations epistemological
Historical-epistemological representations
Analysis of expected behaviors
Statistical analysis Method suited to the type of research
Conjecture (expectations)
Qualitative analysis (action-research)
Experimentation
Refutation (*posteriori* analysis) Wilcoxon-Test

Engineering Didactic as Non-Parametric Statistics

The process of internal validation of Engineering Curriculum is equivalent to the Statistic.

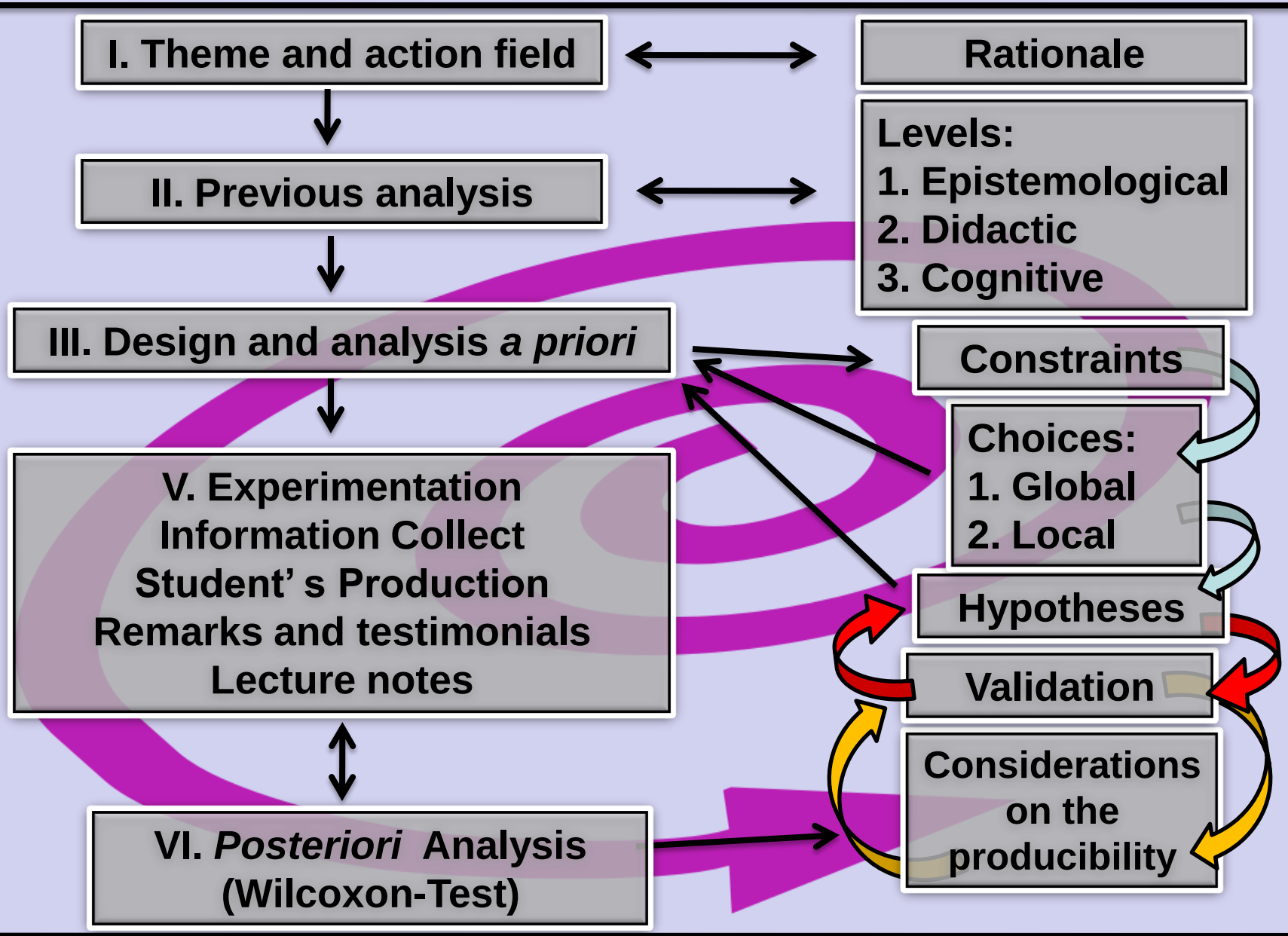
- *It is based implicitly on the premise that measurable differences observed are related to control variables over which different classes and experimental classes witnesses (Artigue, 1990).*
- *Validation process does not use internal validation statistics associated with the experiments in class.*
- *The dependent samples is the equivalent concept, because with dependent samples or matched samples, we get two values for each individual.*

Engineering Didactic and the Wilcoxon test

The Wilcoxon test (before and after) adds to Engineering Curriculum internal validation, allows the comparison of two tests, *a priori* and a *posteriori*, or falsifiability falsifiability, or testability advocated by Popper.

- *Mathematics education has aspects of a science of behavior and requires methods of statistical tests of nonparametric hypotheses.*
- *The Wilcoxon test is applied to social sciences, psychology and behavioral sciences (Siegel, 1977).*

Map of the our propose



Conclusions

- *Provide the Methodology of Engineering Curriculum of falsifiability does not mean failing to recognize the great value and power of explanation*
- *We must test our theories, so we can learn from our mistakes and become better acquainted with our objects of study.*
- *As researchers, we can not only get highly probable theories but explanations.*
- *The Wilcoxon test added to the methodology of Didactic Engineering adds an aspect of falsifiability internal validation without losing its great power explanation.*

REFERENCES

•*ARTIGUE, M.*. ***Ingénierie didactique.*** *Recherches en Didactique des Mathématiques, vol. 9, n°3, pp. 281-307. La Pensée Sauvage, 1990*

•*POPPER, K. A****.. Conjecturas e Refutações****, Tradução de Benedita Bettencourt. Coimbra: Livraria Almedina, 2003*

•SIEGEL, S. **Estatística não-paramétrica** (para as ciências do comportamento). Rio de Janeiro: Editora McGraw-Hill do Brasil, 1977.

•SPAGNOLO,F**., L'Analisi Statistica Implicativa : uno dei metodi di analisi dei dati nella ricerca in didatticadelle Matematiche**, Troisième Rencontre Internazionale A.S.I. (Analyse Statistique Implicative), Octobre , Palermo, Itália, 2005

•VERZANI, John, **Simple R** , contributed em www.r-project.org, acesso em 15/02/2010.

Celina A. A. P. Abar - abarcaap@pucsp.br

José Miguel Bezerra Filho – profjmb@msn.com

Péricles César de Araújo – pericles@uefs.br

Sonia Barbosa Camargo Igliori- sigliori@pucsp.br

Thank you!