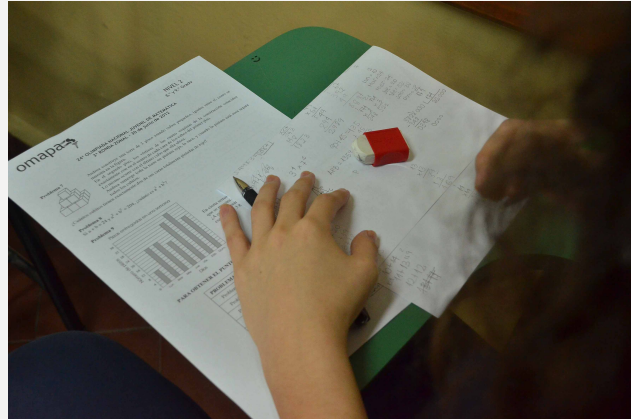


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International Seminar



**STATISTICS
EDUCATION**

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**WHAT DOES THE TERM
“QUANTITATIVE
LITERACY” MEAN TO
YOU AND HOW IS IT
USED IN YOUR
COUNTRY?**

QUANTITATIVE LITERACY

The term statistical literacy (Iddo Gal, 2002) refers broadly to two interrelated components

- People's ability to interpret and critically evaluate statistical information, data-related arguments, or stochastic phenomena, which they may encounter in diverse contexts,
- Their ability to discuss or communicate
 - their reactions to such statistical information,
 - their understanding of the meaning of the information,
 - their opinions about the implications of this information,
 - their concerns regarding the acceptability of given conclusions.

QUANTITATIVE LITERACY IN PARAGUAY

- In Paraguay the term “quantitative literacy” it is not known or discussed

QUANTITATIVE LITERACY IN PARAGUAY

- There are not groups or academic discussion instance regarding educational issues. Curriculum changes and educational instructions are imposed and developed exclusively by a very small and closed group of technicians from the Ministry of Education, who remain throughout their entire career in the Ministry, exercising mainly administrative tasks.

QUANTITATIVE LITERACY IN PARAGUAY


- It is one of the most important flaws in the system and is one of many factors that explain why Paraguay is ranked in 138th place among 148 countries by the World Economic Forum, in terms of the quality of its educational system.

QUANTITATIVE LITERACY IN PARAGUAY

- Inquires made by the Ministry to other academic sectors, such as universities and practicing teachers, are sporadic and disjointed.

QUANTITATIVE LITERACY IN PARAGUAY

- A few different academic groups and NGOs linked to education have so far failed to form an opinion maker community.



**DO YOU AGREE OR
DISAGREE WITH THE
STATEMENT THAT THE
CONCEPT OF “**DATA
ANALYSIS**” CAN BE A
UNIFYING CONCEPT IN
TEACHING STATISTICS?
EXPLAIN.**

DATA ANALYSIS

- The concept of “data analysis” can give a better idea about teaching Statistics than the “Data and Statistics” term used in Paraguay

DATA ANALYSIS

- The emphasis in the word “analysis” can give:
 - to the generalist teachers (K-1 to K-6), a better idea of the profundity and complexity of statistical thinking
 - to Math teachers (k-7 to k-12) a reference to the approaches focused on Quantitative Literacy against the traditional approaches focused on calculus



**WHAT IS THE STATUS
OF STATISTICS IN THE
K-12 CURRICULUM IN
YOUR COUNTRY?**

K1-K6 STATISTICS CURRICULUM IN PARAGUAY

The K-1 to K-6 curriculum has three thematic Units

- Numbers
- Geometry
- "Data and Statistics"

ABILITIES FROM K-1 TO K-3

To create and solve problematic situations in the immediate environment involving the use of: Fundamental operations of natural numbers up to one hundred thousand, positive rational numbers to the tenths, units of measurement, perimeter of plane geometric figures and **basic procedures statistics.**

ABILITIES FROM K-4 TO K-6

To create and solve problematic situations involving the use of basic operations of natural numbers up to one hundred million positive rational numbers in fractional and decimal notation to the millionth, measurement units, areas and volumes of geometric bodies and **statistical tables and graphs.**

ABILITIES FROM K-2 TO K-6

K2	Use simple data collection techniques
K3	Use simple data collection techniques
K4	
K5	Use simple data collection techniques
K6	

ABILITIES FROM K-2 TO K-6

K2	Arrange data set in simple tables according their characteristics
K3	Represent data
K4	Construct and interpret tables with collected data
K5	Organize data gathered in tables
K6	Build statistical tables and graphs

ABILITIES FROM K-2 TO K-6

K2	Represent data collected from the environment with pictograms Interpret data represented in pictograms
K3	
K4	
K5	
K6	

ABILITIES FROM K-2 TO K-6

K2	
K3	
K4	Represent results from simple surveys in vertical bar graphs
K5	
K6	

ABILITIES FROM K-2 TO K-6

K2	
K3	<p>Interpret data using:</p> <ul style="list-style-type: none">▪ Concept of frequency as the number of times that data is repeated▪ Absolute frequency tables▪ Horizontal bar charts
K4	
K5	<ul style="list-style-type: none">▪ Interpret statistical information, based on:<ul style="list-style-type: none">▪ Frequency tables (absolute and relative)▪ Line graphs
K6	<ul style="list-style-type: none">▪ Interpret statistical tables and graphs, using:<ul style="list-style-type: none">▪ Absolute, relative and percentage frequency▪ Frequency tables▪ Pie charts

ABILITIES FROM K-2 TO K-6

K2	Use mathematical notation and terminology appropriate to the context
K3	Read, understand and use mathematical notation and vocabulary appropriate to the context.
K4	Read, understand and use vocabulary and notation appropriate to the context
K5	Read, understand and use vocabulary and notation appropriate to the context
K6	Read, understand and use vocabulary and notation appropriate to the context

ABILITIES FROM K-2 TO K-6

K2	Recognize the importance of organizing and representing data in tables or pictograms
K3	Recognize the importance of organizing and representing data for a better understanding of their environment
K4	Understand the use of basic elements from Statistics for representation and interpretation of data in order to avoid the manipulation of information
K5	Appreciate the use of Statistic knowledge and procedures in making appropriate decisions
K6	Make judgments about information that comes from various sources

K1-K6 STATISTICS CURRICULUM IN PARAGUAY

The K-1 to K-6 curriculum in Paraguay

The K-1 to K-6 curriculum in Paraguay has three thematic Units: Numbers, Geometry and, "Data and Statistics".

Characteristics of the Data and Statistics Unit

- Include development of basic concepts from K-2
- Emphasize problem solving as the main competition to be developed by students
- Include complex issues such as making pertinent decisions, appropriate interpretation to avoid manipulations, and critical judgment of information regarding various sources

K1-K6 STATISTICS CURRICULUM IN PARAGUAY

The K-1 to K-6 curriculum in Paraguay

The K-1 to K-6 curriculum in Paraguay has three thematic Units: Numbers, Geometry and, "Data and Statistics".

- Lack of details and examples that can provide more information to teachers on how to develop the included topics
- Allow, through free interpretation of the contents and methodological explanations, to create a quite appropriate plan of development of the topics

K1-K6 STATISTICS CURRICULUM IN PARAGUAY

In practice

- The Unit of "Data and Statistics" is not developed in most schools, especially in the public ones
- In those few which do it, almost all private ones, usually only the construction and interpretation of pictograms, bar and pie charts are developed
- Rarely some teachers make their students do simple surveys including the implementation, interpretation, graphical representation and analysis of results

K1-K6 STATISTICS CURRICULUM IN PARAGUAY

In practice

- I don't know any single case of teachers doing the most complex items as those related to the development of critical judgment
- Solving problems ability isn't developed

**K7-K12 STATISTICS CURRICULUM
IN PARAGUAY**

MIDDLE SCHOOL COMPETENCE (7th, 8th and 9th grades)

It is important to mention that the first two capacities to be achieved by students of 7th, 8th and 9th grades are the same.

7 th grade

- Uses the vocabulary and notation of Statistics, according to requirements of context.
- Recognizes the importance of proper use of statistical procedures and objective communication of the results obtained.
- Uses survey and / or interview as data collection techniques drawn from different contexts.
- Organizes data in frequency tables; absolute, relative and percentage.
- Represents data by using pie charts.
- Interprets data represented by pie charts and frequency tables.
- Uses mode to identify the behavior of ungrouped data.
- Draws conclusions from the interpretation of charts , pie charts and mode.

8 th grade

- Uses the vocabulary and notation of Statistics, according to requirements of context.
- Recognizes the importance of proper use of statistical procedures and objective communication of the results obtained.
- Represents data by using frequency tables and histograms.
- Interprets data represented by frequency tables and histograms to obtain the information provided.
- Uses the mean to identify the behavior of ungrouped data.
- Draws conclusions from the interpretation of the frequency tables , histograms and mean .

9 th grade

- Uses the vocabulary and notation of Statistics, according to requirements of context.
- Recognizes the importance of proper use of statistical procedures and objective communication of the results obtained.
- Represents data by using frequency tables and polygons frequency .
- Interprets data represented by frequency tables and polygons frequency to obtain the information contained therein.
- Use the median to identify the behavior of ungrouped data
- Draws conclusions from the interpretation of tables, frequency polygons and median .
- Understands basic notions of probability
 - Event
 - Sample space.
 - Outcomes favorable. Outcomes in the sample space
 - Probability of an event. Laplace rule.
- Solves simple problem situations involving the use of the probability of an event

CERTIFICATE IN SCIENCE STUDIES

Specific plan: Emphasis in Social Sciences

Specific competence

Applies statistical measures calculus and prior learned methods in the discipline in the study of social reality.

Capabilities to be developed

1st. Year of high school

- Determines the relationship between the various components of scientific research
 - Population , sample, individual
 - Variables. Types of variables
- Use measurement scales in data distribution
 - Nominee
 - Ordinal
 - Intervals
 - Proportions
- Organizes in tables of frequency distribution the information collected in different social realities.
 - absolute frequency , relative, cumulative and percentage (data clustered and nonclustered)
 - Class mark

- Represents data graphically clustered and nonclustered
 - Bar Chart
 - Line graph
 - Pie chart
 - Histograms
 - Frequency Polygons
 - Ogive
- Interprets data presented in frequency distribution tables and statistical graphics

- Analyzes the characteristics of a population being subject of study by calculating measures of position and dispersion of data clustered and nonclustered .
 - Measures of central tendency : mean, median and mode
 - Other measures position : quartiles and percentiles
 - Measures of dispersion : range , mean deviation , variance and standard deviation .
- Applies the method of least squares to fit the set of data to a straight line.
- Graphs the linear regression equation
- Uses the regression line on projections and estimates of results from simple data.
- Uses the linear correlation coefficient in determining the degree of relationship between variables.

CERTIFICATE IN SCIENCE

Specific plan: Emphasis in Basic Sciences and technologies

Specific competence

Applies Statistical methods and procedures in making sound decisions in situational problems and in the process of making statistical inferences through information collected from the environment.

Capabilities to be developed

Second year of high school

- Determines the relationship between different components of statistical research
 - Population , sample, individual
 - Variables . Types of variables
 - Simple random sampling method
- Uses Measurement Scales in the distribution and Data Classification
 - Nominee
 - Ordinals
 - Intervals
 - Reasons
- Determines the frequency distribution of data sets
 - Absolute frequency
 - Relative frequency
 - Percentage frequency
 - Cumulative frequency

- Organizes in tables of frequency the distribution of the information collected from different social and environmental realities.
 - Frequencies: absolute , relative , cumulative and percentage (clustered and nonclustered data)
 - Size range (clustered data)
 - Class mark (clustered data)

- Represents graphically clustered and nonclustered data.
 - Bar Chart
 - Line graph
 - Pie chart
 - Histograms
 - Frequency Polygons
 - Ogive

- Interprets data represented in frequency distribution tables and statistical graphics.
- Analyzes the characteristics of a population being subject of study by calculating measures of position and dispersion of clustered and nonclustered data.
 - Central tendency : mean, median and mode
 - Other measures position : decile , quartiles and percentiles
 - dispersion : range , mean deviation , variance and standard deviation
- Applies the method of least squares to fit the set of data to a straight line.
- Graphs the linear regression equation.
- Uses the regression line on projections and estimates of results from simple data.
- Uses the linear correlation coefficient in determining the degree of relationship between variables.

THANKS!

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