THE ROLE OF STATISTICS AND NUTRITION AT CARLITOS SCHOOL (SÃO PAULO, BRAZIL) — A PEDAGOGICAL PROPOSAL FOR THE STATISTICS CURRICULUM FOR THE FIRST YEARS OF BASIC SCHOOL

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This project aims at comprehending statistics and crossing themes in basic schooling. A team of teachers, a doctor, a nutritionist and statisticians are to carry it out. First, parents and employees are made aware through lectures on nutrition. Then, lunch and snacks offered at school are controlled. After that, classes on food nutrients, anthropometrical evaluations and double input tables will be executed. According to the diet offered, probabilities referring to BMI will be calculated. Functions will be used as mathematical models to express energy necessities. Menus will be developed according to the food pyramid, and caloric value will be evaluated according to linear algebra counting techniques. Final results are to be counted up and analyzed. An open software (*R*) *will be used as technology support.*

INTRODUCTION

For many centuries the mankind has been living on the Earth's surface and the children's alimentation has been always established in a monotone way that used to obey a long period of nursing, restricted to the breast and then the introduction of a supplementary food according to the age of the child. The mother's milk abandonment, allergies and rejection of artificial kinds of milk are some causes of the precocious weaned and many problems related to these situations. The use of dense and fatty food, the frequent consumption of snacks, the omission and meal changes, worsen the problem. In the twenty late years, the introduction of these inadequate nourish habits, the globalization of fast food, the industrialization and especially the sedentary life have been driven the children and teenager population to be obese. It affects 25% of the scholar population in São Paulo city, Brazil (Fisberg, 2005).

The school is a privileged center to promote health because it is a place where many people spend a great part of their time, cohabiting and working. When this instruction environment links students, their relatives, teachers, employees, administration staff and professionals connected to the health range, in a dynamic way, it provides conditions to develop activities which reinforce the school capacity to change this place in a propitious local to acquire knowledge and, at the same time, life's quality. From this point of view, there is an exceptional opportunity to conjugate the educative process to a furnished place of snacks and meals, a perfect laboratory to a nutritional education (Fisberg, 2005).

The didactic project is the mean planning instrument, which includes reflection, systematization and historical registry of an academician practice, because it expresses the intervention of teachers in the classroom. In other words, it shows how to understand the teaching and learning act, and asserts the student to live in an educational environment which permits them to become a cultural agent and change their own experiences according to the attained knowledge acquired individual and collectively.

Escola Carlitos's pedagogical project (Anabuki, 2005) consists of:

> "The contents included in *Escola Carlitos* curriculum are the culture and knowledge data, based on facts, conceptions, procedures, values and attitudes - which are considered priorities to be learned by the students, meanly through the systematic educational actions organized in didactic projects, intra or inter-curricular.
>
> The knowledge related to the individual development, intellectual, sensor-motor and social-affective capacities enable the students, from *Educação Infantil* and *Ensino*

Fundamental, to establish relations between the theoretic contents and functional aspects and it makes them to comprehend and act in the reality.

The *Educação Infantil* follows the children's growth and interferes on it to make it better and to develop the intellectual, physical and affective capacities. The purpose is to offer through this stage a great number of experiences which allow the acquisition of the mother's tongue and other ways of expression and socialization, because it is known that it is the way the individuals construct their post-knowledge. That is why during this period the school and the teachers intend to help the students doing that they build linguistic, expressive and social-affective contents which will help them working as a base and a learning instrument pertaining to the *Ensino Fundamental* and students relationship with the others.

During the *Ensino Fundamental I*, from the first up to the fourth grades, the students have to build their basic cognizance related to reading, writing and calculus, to permit them the social communication and world's recognition. It also will amplify their spatial and temporal notions as well as the past and actual information. Talking about the material development, the students will improve their body abilities through some specific physical activities.

In the *Ensino Fundamental II*, from the fifth up to the eighth grades, the students learn individual and collective ways of work, with the intention to assimilate and develop the argumentative speech and the critical spirit. It is a result of the economic, politics and socio-cultural studies in the world. In this stage, a great value is given to the deepened of the curricular knowledge allowing the individuals to establish relations between these facts, concepts and attitudes. In the affective level, because of the age, the student's independence is emphasized to estimate a responsible actuation in all spheres of the society."

The project "*The Function of Statistics and Nutrition in Escola Carlitos*" amplifies the themes: *Tratamento da Informação* and the *Recurso a Tecnologias da Informação*, mentioned on the *Parâmetros Curriculares Nacionais* - consolidated by *Ministério da Educação e do Desporto* in 1997 - as well as the Chapter 26 from law nº 9.394 of *Lei de Diretrizes e Bases* (MEC, 1997).

"*Chapter 26*. The *Ensino Fundamental* and *Ensino Médio*'s scholar curriculums must have a common national base to be complemented in each educational and school system, including a diversified part required by the regional characteristics, the local culture, the economy and the clientele."

And then, it shows as a justification (i) the evidence of a precarious and non-healthy alimentary culture among children and teenagers; (ii) the lack of a standardized curriculum of Statistics to the *Ensino Fundamental I* and *II* students; (iii) the lack of a didactic material suitable to *Ensino Fundamental I* and *II* grades; (iv) the lack of capable professionals to develop in a right way the contents of Statistics subject; (v) the evidence of a shortage in the learning process of Statistics observed in students who attend College degree.

METHOD

The elaboration of this project was defined under the analyze of the Mathematics (Algebra), Statistics and Nutrition basic student's learning process realized by the authors mentioned above and by *Escola Carlitos*. The following work stages were defined (with i. to vi. accomplished from August 2005 up to November 2005):

i. a doctor and a nutritionist accomplish lectures to the employees, parents about children and teenagers' alimentation;
ii. the nutritionist makes the control of snacks and lunches offered in the school;
iii. the students attend to seminars about macro and micronutrients in alimentation;
iv. the nutritionist does an anthropometrical evaluation (build and weight measurements) in the students;
v. each student calculates the BMI value (Body Mass Index) concerned about their measurements;
vi. the teacher and the nutritionist build the School's Database 1 (student, age, evaluation date, weight, height, BMI);

vii. the nutritionist, the Mathematics teacher and the statisticians (Teachers of the Department of Statistic of Universidade Federal do Pará) build and analyze the graphs, growth curves and tables, using the Database 1 and the R software, and show these to the students in the Mathematics and Transversal Themes classes;
viii. students analyze the Database 1 graphs and the growth curves in the Mathematics and Transversal Themes classes;
ix. students answer the questionnaires about their alimentary and physical habits which the Mathematics teacher and the nutritionist built;
x. students elaborate Database 2 (student, age, questionnaire's date, consumed food practiced physical activities, activities frequency);
xi. each student calculates the total energetic value spent according to their ages, using the Database 2, the formulas $\{GET_{boy} = 88{,}5 - 61{,}9(age) + (activity)[26{,}7(weight) + 903(height)] + 25(kcal)\}$ for boys and $\{GET_{girl} = 135{,}3 - 30{,}8(age) + (activity)[10{,}0(weight) + 934(height)] + 25(kcal)\}$ for girls, written calculus, calculator, the Microsoft Excel, R software and then they complement Database 2 using these variables;
xii. students, under the Mathematics teacher and the statisticians orientation, build tables, graphs, using the Database 2, the Microsoft Excel and R software
xiii. students, under the nutritionist and the Mathematics teacher orientation, elaborate the carte based on the alimentary pyramid, the food caloric value and on the Database 2; using the algebra techniques of linear systems, *Winplot* and *R*, free softwares and the open source code.

This way, the project "*The Function of Statistics and Nutrition in Escola Carlitos*" intends, as the *main objective*, to learn actual topics related to the programmatic content of the resolutions of linear equations systems, combinatory analysis, probability and descriptive statistics into the Nutrition context, and, as the *specific objectives*: (i) to learn about the daily nutritional necessities of the *Ensino Fundamental I* and *II* in a qualitative and quantitative way; (ii) to learn how to combine the nutritional necessities to the physical activities, according to their kind (male or female), height, weight and age.

RESULTS AND DISCUSSION

The statistic is officially included in the *Currículo Oficial da Escola Básica* edited in 1997 in the *Parâmetros Curriculares Nacionais*, although it is an antique science - used for more than two hundred years by governments and other sciences (SEE-SP, 2005).

The teaching and learning process of *Tratamento da Informação* and the *Recurso a Tecnologias da Informação* comprehends the accomplishment of different didactic situations which appear in a sequence that serves in the learning progression in its different moments. They are always in service of the different competencies that are wanted to be developed in the student (Albanese *et al*. 2005). "Nowadays, being mathematically competent involves, in an integrated way, an entirety of attitudes, capacities and knowledge related to Mathematics" (DEB/ME, 2001).

The sequences of the final activities of the learning project mentioned above were elaborated to attend the following competencies: (i) to relate the enunciation registries, algorithm and the resolutions obtained in documents (or reproductions) of different nationalities and epochs, to recognize the counting algorithms, tables, graphs, calculus with relative frequency, probability, measures of central tendency and dispersion; (ii) to relate and amplify the counting algorithms, tables, graphs, calculus with relative frequency, probability, measures of central tendency and dispersion to resolve or formulate problem-situations using composition and decomposition of pictures, formulas, calculators, *Microsoft Excel* and the statistic software *R*; (iii) to formulate generalizations, to test conjectures, to justify strategies and algorithms used to optimize the resolution of problem-situations involving counting algorithms, tables, graphs, calculus with relative frequency, probability, measures of central tendency and dispersion.

Up to the present moment — from August 2005 to November 2005 —, it was realized the following didactic situations: (1) discussions about children and teenagers alimentation; (2) the controlling of snacks and lunches offered in the school; (3) lectures about alimentation macro and micronutrients; (4) anthropometrical evaluation (build and weight measurements); (5) BMI calculus. It is observed that relatives, employees and students are more worried about alimentation (in a qualitative and quantitative way), on the scholar, familiar and social ambits. In

a timid way, the community begins its commentaries about these little alterations in the alimentation habits. Fruit, legumes, vegetables, milk and its derived appear more frequently in different meals (organized, or almost!). In other words, *Escola Carlitos* recognize the interference on the scientific and technologic development in the physical and social environment causing critical analyses about this influence; it is comprehensive that these acts and decisions motivate the physical and psycho-social health individual or collectively; moreover, it shows habits to a healthier life, benefiting the body.

We intend to, at the end of 2006, the students acquire knowledge about: (i) alimentary groups; (ii) individual and collective energetic necessities; (iii) individual and collective body mass index; as an aim to the students become capable to elaborate and to analyze their carte and physical activities according to the *Escola Carlitos*'s students profile.

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