STATISTICAL KNOWLEDGE IN THE SCHOOL CURRICULUM: STUDYING WAYS OF GOVERNMENT

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This paper approaches the statistical knowledge and its insertion in the school curriculum, by considering its interface with the fields of History, Epistemology and teaching of Statistics. The concept of numeramentality is used from an analytical perspective to study normativities based on quantification, measurement, use and record of numbers, which have guided ways of thinking and acting in contemporaneity. The methodology consists of a historical, genealogically oriented approach founded on Michel Foucault's work, and a pragmatic understanding of language and practices as proposed by Wittgenstein. Risk is analyzed as an element that currently acts in the government of populations and individuals by becoming a curriculum component. The study also highlights the way through which the Brazilian school curriculum has produced socially desirable ways of thinking and acting in accordance with the governmental order.

NUMERAMENTALITY AS A THEORETICAL-METHODOLOGICAL LANDMARK

The This paper has derived from a post-doctoral research project titled "Statistical knowledges and social practices: statistical normativity as a cultural production" (research financially supported by CAPES/MEC/BRASIL, Registration nr. *4392-13-2)*, which was carried out in the laboratory UMR5191 ICAR, with the collaboration of Professor Jean-Claude Régnier, from University of Lyon 2 – France. Conceptions of language normativity and knowledge for the constitution of practices and conducts, as proposed by Ludwig Wittgenstein and Michel Foucault, have theoretically supported this study. This issue has led us to deepen our understanding of the relationships between language, subjectivity and practice (Bello & Régnier, 2014b), through which the ways of seeing and saying can both guide and produce ways of thinking and acting. In order to approach issues concerning the statistical knowledge, its history and insertion in the school curriculum, it was also necessary to consider the Foucauldian concept of governmentality (Foucault, 2004) to evidence the relational characteristic between power-knowledge and arts, rationalities, practices and technologies for production and regulation of conducts. For M. Foucault, governing has to do with the exercise of power that manages the goals and purposes of the conducts of each and every one by means of subtle processes of domination.

Likewise, through an analogy with the Foucauldian concept of Governmentality, we have coined the term "Numeramentality" (Bello, 2011) to express an analytical perspective for the study of normativities that produce, guide and rule conducts, i.e. ways of thinking and acting in contemporaneity that are based on measurement, quantification and recording processes. Numeramentality (Bello, 2012), in this case, joins the arts of governing to practices and normativities related to numbering, measuring, counting, serializing, which guide the discursive production that both regulates conducts and stimulates subjectivation processes. Methodologically, it is related to the study of the productivity and centrality of quantities, numbers (measures, rates, indexes, etc.), their use as an expression and organization of the truth and the "reality", thus redirecting the ways of thinking and conducting people (subjectivities) within a society (Bello & Régnier, 2014a). Quantifying and measuring are here regarded as configurations of a numerical form deriving from a series of socially accepted conventions which in turn involve comparisons, negotiations, commitments, translations, codes, estimates, to lead to the configuration of a number (Desrosières, 2008a, p.10). Therefore, from the numeramentality perspective, the statistical knowledges and all the forms of quantification as a whole reconfigure and transform the world in its very existence through their propagation and use in scientific, political and social domains.

The National Curriculum Standards (NCS) for Basic Education and High School (Brasil, 1998; 2006) has been taken as our empirical material. This document has been selected because it officially introduced the study of Statistics in Brazilian schools under the denominations of

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"statistical treatment of data" and "Statistics and Probability". Procedurally, we have followed a historical-philosophic approach whose interpretative-analytical perspective examines what is said or done in terms of production of curriculum practices (Bello & Régnier, 2014a). In this kind of analysis, statistical knowledge is seen as an element influencing the ways of thinking and acting in the world; furthermore, its importance and presence in the Brazilian school curriculum would be able to generate realities and produce subjects. By modeling conducts, not only can statistical knowledge be considered as a logical-mathematical system, but also as a field of cultural practices which standardize and individualize conducts. In this sense, the numbers rule because they function as carriers of truth and weave discourses, thus enabling the creation of different identities, either individual or collective; hence, numeramentality can be referred to as a numerical rationality that organizes ways of seeing and conducting the "real".

WHEN RISK BECOMES A CURRICULUM COMPONENT

Unemployment, inflation, development, poverty, life expectation are topics whose quantification and measurement are regarded as points for discussion and support of school practices. Such topics are important not only because they describe political-economical situations and contribute to citizen education, but also because they are considered as elements of an empirical-social context from which mathematical or statistical knowledge can be taught (Bello & Régnier, 2014b). Nevertheless, we might ask: Why do certain topics developed from certain kinds of knowledge seem to be more important than the others? Why should statistics become a curriculum object in school programs that encourage us to search for good teaching and learning practices? In sum, what is the statistical knowledge of interest in a school curriculum?

If we consider language as a producer of meanings associated with the performance of practices (Bello & Régnier, 2014b), the word *Statistics* can be related to practices of construction, unification and management of the State. According to Foucault (2004), statistics has been linked to government practices since the 18th century in Western States, which were concerned with their population conduct. In this context, the State government action is performed by means of (active and rational) quantification, which is produced and projected on each and every individual. This can be seen as an articulation between "practices of power" and "practices of knowledge", or between practices of government and practices of statistical production.

Statistical knowledge in association with mathematical tools and probability estimates were rapidly developed along the 19th century and the first half of the 20th century. However, historical studies carried out by Desrosières (2008b, 2010) and Volle (2004) have shown that the emergence of the neoliberal States - post-war democracies - has produced statistics with a strong relation with the public action of such States and their performance evaluations. Between 1940 and 1960, increased production of rates of unemployment, inflation and fertility, among others (Desrosières, 2008b) was noticed.

Coincidentally or not, such increase has not only contributed to the refinement of management practices, but also to the development of scientific practices by joining knowledge and decision-making, which means that decisions should be carefully made, i.e. with knowledge of risk management. Then, statistical knowledge and probability estimates grow in strategic importance, since the population and its individuals become objects of science; consequently, they can be known, and their characteristics and regularities can be produced, recorded, estimated and predicted.

Risk is a problem demanding solution. According to Bouyssou (1997), risk is a barely accepted, sometimes disturbing, baffling thing; reactions to it may be emotional or irrational. In this sense, risk is associated with the idea of social regression and can draw special attention to daily life: risk of unemployment, car accidents, smoking, excessive use of medication, drug addiction, consumption of industrialized food, etc. As the risks taken by an individual may influence the population as a group, having a positive or negative individual attitude towards risk requires the study and discussion on that issue in the school. Therefore, it is not by chance that topics such as unemployment, car accidents, use of medication, etc. have functioned as starting points for discussion at school.

In the school context, fear of risk causes the student-subjects to both perceive themselves as "being in a risk situation" and attempt to become prudent subjects or good consumers, for

instance. Statistical knowledge will contribute to such perception and understanding as much as possible by evidencing that it is really useful to the government of each and every one.

FORMS OF GOVERNMENT, FORMS OF SUBJECT IN THE CURRICULUM

The introduction of the statistical knowledge in the school curriculum seems to be more linked to the production of a politically defined student-subject than to the construction of scientific spirit. Although practices related to unemployment or inflation are usually said to "be part of reality" or justify processes of didactic transposition (Bello & Régnier, 2014b), the main interest seems to be in the political construction of an individual who is able to manage uncertainties and risks in order to become less burdensome to the State. In this sense, in the contemporary neoliberalism, cautiousness and ability to make decisions are important characteristics for self-management and the positioning of the so-called "citizen-student-subject" before risks.

In general, statistical knowledge is organized in the Brazilian school curriculum as knowledge. Student-subjects are supposed to exert autonomy based on the school statistical knowledge to resolve daily situations or position themselves before statistical data, such as those spread by the media. As it is stated in the High School Curriculum Standards (HSCS), the subjects are expected to "understand and *make judgments* about statistical information of social, economic, political or scientific nature shown in the form of texts, news, reports, censes, surveys and other means" (Brasil, 2006, p. 124, our emphasis), and this comprehends the "social use" of statistical data and the way they are spread by the media. Data and probability analyses, according to HSCS (Brasil, 2006, p.127), are fundamental, considering social and economic problems related to health, population, means of transportation, budgets and market issues. This is how the modern concern with uncertainty has been translated into the contemporary perspective of risk based on the prediction of results. This is also how merely intuitive notions of chance and uncertainty can be explored at school in situations in which the students carry out experiments and observe daily events so that, when confronted with the uncertain, they can identify probabilities and position themselves through decision-making. The calculated prediction, thus, emerges as a possible treatment of uncertainty.

Likewise, in HSCS, actions taken by student-subjects are supposed to be grounded on cautiousness and their ability to make decisions by themselves. In a world in which social, cultural and professional needs have acquired new contours, all areas require that citizens have some competence in Mathematics to draw conclusions, develop arguments, *act as cautious consumers or make decisions in their personal and professional lives* (Brasil, 1998). Being able to make decisions, taking initiative and feeling confident to use knowledge in a timely manner are fundamental features. This kind of performance is translated into identities, i.e. ways of being a subject, and experiencing and living one's own subjectivity. Cautious subjects, good citizens, good consumers are subjects who acknowledge themselves by means of the so-called statistical knowledge. This operates as a technology of control, uncertainty management and risk management in decision-making, as required for the production of such forms of subject.

CONCLUSION

One cannot say that subjectivities have no relation with performance of (scientific, curricular, pedagogical…) practices. Statistic knowledge as a component of curriculum practices has both functioned as a means of production of subjects and focused on the articulation between the so-called school "statistical knowledge", the pedagogical processes of teaching and learning, and the production of subjectivities.

This paper has attempted to invite readers to reflect on the reasons why statistical knowledge has become important and necessary in the contemporary society and in education in general. It has also questioned how and why such knowledge has been introduced in the curriculum of Brazilian Basic Education. Likewise, as statistical knowledge has become a way to guide our view of daily life, it is also necessary to think about their effects and scope. As it has been described here, statistics allows for the establishment of relationships with oneself through the use of validated values, categories and concepts associated with a certain way of thinking that has historical, social and political effects. Thus, we should reflect on the purposes that this knowledge as a technology of government has established for the practices that it constitutes.

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