STATISTICAL LITERACY: A STRATEGY TO PROMOTE SOCIAL JUSTICE

LETRAMENTO ESTATÍSTICO: ESTRATÉGIA PARA PROMOÇÃO DA
JUSTIÇA SOCIAL

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ABSTRACT

This paper aims to highlight the intention of undergraduate students, who act as teachers of the Program of Statistical Multimedia Literacy (LeME), to promote Social Justice through Statistical Literacy. The LeME consists of an Extension Program, linked to the Federal University of Rio Grande (FURG), which has the purpose of promoting the human right of equality in the scope of Statistical Education. Based on concepts of Descriptive Statistics, the LeME seeks to statistically teach young people in socioeconomic and environmental vulnerability, as well as to provide to the academics an experience in teaching initiation. The analysis of the corpus, composed of the reflexive diaries of actions developed in statistical workshops prepared by the undergraduates, was carried out through the methodology of Content Analysis. This process resulted in two categories: social context and criticality. The discussion of these results, based on Social Justice referential, in the interface with Education, Mathematics Education and Statistics, generated arguments that endorse and legitimize the social context and criticality as aspects that promote Social Justice through Statistical Literacy.

Keywords: Statistical Education; Statistical Literacy; Social justice; Program of Statistical Multimedia Literacy.

RESUMO

Este artigo tem como objetivo evidenciar a intenção de estudantes de graduação, que atuam como professores do Programa de Letramento Multimídia Estatístico (LeME), de promover a Justiça Social por meio do Letramento Estatístico. O LeME consiste em um Programa de Extensão, vinculado à Universidade Federal do Rio Grande (FURG), o qual tem o propósito de promover o direito humano de igualdade no âmbito da Educação Estatística. A partir de noções de Estatística Descritiva, o LeME busca letrar estatisticamente jovens em vulnerabilidade socioeconômica e ambiental, além de propiciar, aos acadêmicos, uma experiência na iniciação à docência. A análise do

corpus, composto pelos diários reflexivos de ações desenvolvidas em oficinas de Estatística elaborados pelos graduandos, foi realizada por meio da metodologia da Análise de Conteúdo. Este processo resultou em duas categorias: contexto social e criticidade. A discussão desses resultados, com base nos referenciais relativos à Justiça Social, na interface com a Educação, Educação Matemática e Estatística, gerou argumentos que endossam e legitimam o contexto social e a criticidade como aspectos promotores da Justiça Social por meio do Letramento Estatístico.

Palavras-chave: Educação Estatística; Letramento Estatístico; Justiça Social; Programa de Letramento Multimídia Estatístico.

1. Introduction

Statistic is a fundamental science in the sense that it forms the basis of scientific methods (Batanero, 2001). For this reason, results obtained through statistics or that use elements specific to this area of knowledge are present in the media to subsidize information transmitted to society.

In this scenario, the development of statistical competences is presented as one of the requirements for the exercise of citizenship (Magalhães, 2015; Kataoka, Silva & Cazorla, 2015; Lopes, 2008; Gal, 2002; Rumsey, 2002; Wallman, 1993). From this point of view, actions which promote Statistical Literacy, or in other words, provide a citizen with the ability to interpret and critically evaluate statistical information in an autonomous way (Gal, 2002; Watson, 1997; Wallman, 1993) could be considered practices that imply the progress of Social Justice (Lesser, 2007; Gutstein, 2003; 2006; Cotton, 2001).

In addition to these aspects, many countries included Statistics in Basic Education in order to break with determinism in Mathematics classes (Cazorla, Kataoka & Silva, 2010). Thus, Statistical Education is inserted in both the K12 (Scheaffer & Jacobbe, 2014, Franklin, Kader, Mewborn, Moreno, Peck, Perry & Scheaffer, 2007), and in the official documents that direct Brazilian Basic Education (Brazil, 1997, 1998, 2000, 2006, 2017). However, often in the Basic School, mainly due to gaps in teacher training (Ponte, 2011, Pfannkuch & Ben-Zvi, 2011, Lopes, 2008, Pfannkuch, 2008), this subject is not approached or it is but in a superficial way, which leads to a hiatus in students' teaching (Rumsey, 2002; Sá, Porciúncula & Samá, 2015).

In order to promote equity and equality, in the development of skills and competences about the Statistical Literacy, in the south coast of Brazil, in 2010, the Statistical Multimedia Literacy Program was created. This program, now in its seventh year of execution, also becomes a mainstay for teacher training that promotes the Statistical Literacy of young people with socioeconomic and environmental vulnerability. In this period, records were produced, from which emerge aspects that evidence the promotion of Social Justice (Lesser, 2007; Gutstein, 2003; Cotton, 2001), which compose the corpus of this research. In view of the above, this paper aims to identify in this corpus aspects that demonstrate the intention of the LeME [Program Multimedia Statistical Literacy] team to promote Social Justice through Statistical Literacy.

In order to situate the reader, a contextualization of the LeME will be carried out, followed by a literature review on the promotion of Social Justice in Education,

Mathematics Education and Statistics. The following are the methodological ways which answer the research question: Which aspects highlight the intention of the LeME team to promote Social Justice through Statistical Literacy? From this, some results from the dialogue with the literature review are highlighted.

2. Contextualizing the Program Multimedia Statistical Literacy – LeME

The LeME Extension Program was proposed in 2010 by the team from the Center for Statistical Education [NEE], from the Institute of Statistical Mathematics and Physics [IMEF], Federal University of Rio Grande [FURG]. Since 2011, it was approved by the Program of University Extension of the Ministry of Education of Brazil - PROEXT / MEC / BRAZIL. Starting in 2012, it began its activities, counting predominantly with the leading role of undergraduate students, members of the Education Training Program Connections of Statistical Knowledge [PET SabEst], who act as teachers of LeME. The Program also has the pedagogical support of the graduate students and researchers of the Laboratory of Cognitive Studies and Technologies in Statistical Education - LabEst, where the Statistical Education Research Group - FURG / CNPq is headquartered.

From the outset, the Program has established a partnership with the Sea Boys' Convenience Center [CCMar], FURG. This Center, financed by the National Development Bank [BNDES], serves young students between 14 and 17 years of age in a situation of socio-economic and environmental vulnerability, living in the city of Rio Grande and its surroundings, mainly those from poor communities.

They attend basic pre-vocational courses aimed at the region's needs, offered by the CCMar, in a complementary shift to the school, such as: shipbuilding, baking, nautical education, manicure, confectionery, administrative assistant, personal assistant, computer and knitting. The courses seek to promote professional, social and cognitive skills, with the aim of professionalizing these young people through knowledge and skills related to the contemporary world of work (CCMar, 2018). At this point, LeME started the activities and consequently improved. Still, in actions beyond CCMar, it also benefits other subjects, from different schools and communities in the region of the southern coast of Brazil, FURG's area of activity (Furg, 2018).

At the time of its institutionalization, in 2011, LeME registered as a Citizen Insertion Program: Digital Inclusion and Statistical Literacy was recognized by the Thematic Area Human Rights and Justice, Federal Government and later by the Communication and Education areas. The Program starts from the premise that a subject, to be considered statistically literate, must present five requirements, being:

> (i) knowing why data are needed and how data can be produced; (ii) familiarity with basic terms and ideas related to descriptive statistics; (iii) familiarity with basic terms and ideas related to graphical and tabular displays; (iv) understanding basic notions of probability; (v) knowing how statistical conclusions or inferences are reached (Gal, 2002, p.10).

In order to foster the development of such requirements, the LeME team identified multimedia technologies (Lévy, 1993; Castells, 2002; Negroponte, 1995), such as sounds and images, as a possibility for the promotion of emotion (Damásio, 1996, 2000, Samá, Porciúncula & Carvalho, 2012) in each participant. According to Damásio (1996, 2000), emotion can contribute to the retention and evocation of information in the brain, in this case, referring to Statistical Literacy.

At heart, LeMe contemplates Statistical Literacy and Multimedia. However, it is dynamically constituted and reconstituted from a variety of elements. These are proposed by a traveling and interdisciplinary team of university students - under the coordination of the same teacher, who idealized the said Program - as well as by dialogical interaction with the community of young beneficiaries.

The elements that confer this plurality to the LeMe correspond to the activities proposed in the form of statistical workshops by the teachers in formation, who bring contributions based on different referents, such as: multiple intelligences (Marques, Pitthan, Freitas, & Porciúncula, 2012; Gardner, 1999; 1994a; 1994b), educational games (Freitas & Porciúncula, 2013), contributions of Cognitive Psychology (Santos & Porciúncula, 2013; Ausubel, 1968), group dynamics techniques (Senna, Nyland & Porciúncula, 2013), recreational activities (Votto & Porciúncula, 2016; 2017b; Votto, Porciúncula & Silva, 2015; Fontana, 2015; Luckesi, 2005), among others.

The planning of these workshops, initially, was carried out by the whole team, in a collaborative text. Due to the theoretical and practical learning of this team, a greater autonomy of creation was granted to the teachers (individually or in pairs) to propose individual plans for their workshops, and to submit to the collective contribution. This organization (in group, individually or in pairs) has been alternating, in the course of time, in planning practice.

This extensionist process dialogues and is based on academic productions developed by the FURG Research Group on Statistical Education (Sá, Porciúncula & Samá, 2015), Neuroscience (Samá, Porciúncula & Carvalho, 2012), Theory of Significant Learning (Porciúncula & Samá, 2014), recreational activities (Votto & Porciúncula, 2017a), Learning Projects (Schreiber & Porciúncula, 2017; Schreiber, Ferreira & Porciúncula, 2017; Porciúncula & Samá, 2014; 2015; Freitas, Sá, Porciúncula & Samá, 2013), and Statistical Self-efficacy (Senna & Porciúncula, 2016a, 2014a).

In addition, the LeMe is based theoretically on investigations developed by researchers of other institutions (Scheaffer & Jacobbe, 2014, Franklin et al., 2007, Cordani, 2006, Magalhães, 2018, Lopes, Corral & Resende, 2010; Cazorla, Kataoka & Nagamine, 2010; Garfield, 1995; Batanero, 1999; Pfannkuch & Wild, 2002); and in other references (Kishimoto, 1998, Freire, 2016, Pamplona & Lucchesi, 2009, Piaget 1975, Fagundes, Sato & Maçada 1999, Bandura 1989).

This mosaic of productions composes the base and the horizon of LeMe action, being based, above all, on the Statistical Literacy, through the Multimedia, with a view to the promotion of Social Justice.

3. Literature review

This section aims to clarify how Social Justice is understood in this research, in its interfaces with Education, Mathematics Education and Statistics. Initially, Social Justice is focused on the bias of social exclusion in the field of Education and, later, on its broader character.

This exclusion, according to Freire (2016), in its most serious form, prevents a person from learning how to read and write, which corresponds to Literacy. This, however, in the Freirean perspective, contemplates a broader conception of reading and writing,

since it considers the sociopolitical dimension, that is, the development of the capacity to read the world (Freire, 1998). The literacy thus conceived comes close to what has been called, by other authors, Letramento (Soares, 2005).

In the field of Statistical Education, when it encompasses the aforementioned socio-political dimension, we have the Statistical Literacy, that is, the development of the ability to interpret and evaluate statistical information critically (Gal, 2002; Watson, 1997; Wallman, 1993). As can be seen, Literacy in the area of Statistics, as well as Literacy in the Freirean perspective, transcends the acts of reading and writing, so that it is not restricted to performing statistical calculations. This approach is shared by Gutstein (2006), when he suggests that Mathematical Literacy should be guided by the development of competence in reading the world.

In this perspective, social exclusion, as far as Statistical Education is concerned, corresponds to the inability to read critically the statistical information that is widely disseminated in society, mainly by the media. Thus, Statistical Literacy presents itself as an alternative to this exclusion, since its main objective is to enable the citizen to read autonomously and critically information of this nature, which, therefore, can promote Social Justice.

In view of the fact that it is now intended to identify aspects that evidence the intention to promote Social Justice through Statistical Literacy, it is necessary to point out the understanding about this in the present study. Cotton (2001) clarifies that Social Justice is associated with the rights of every human being, such as education, individual choices - without the loss of opportunities arising from discriminatory acts - as well as the right to combat practices that are perceived as unfair (Cotton, 2001).

Social Justice teaching views students themselves as part of the solution to injustice, from infancy to adulthood. To be possible, these subjects must understand the conditions of life itself, as well as the sociopolitical movements that occur in the spaces in which they are inserted (Gutstein, 2003). Thus, these individuals are expected to develop a socio-political consciousness, which corresponds, according to Gutstein (2003), to the *freiriana* consciousness.

Thus, to solve injustices, students also need to develop a sense of agency, which means believing that they can make a difference in the world as protagonists of history. Such an agency - personal and social - is important for achieving equity. In addition to sociopolitical awareness and agency, the development of social and cultural identities becomes relevant, considering the richness and uniqueness of each culture (Gutstein, 2003). Thereby,

> Even if education alone does not ensure social justice, nor can it only be expected to eradicate violence, respect for the environment, the end of social discrimination, and other humanist goals that are posed today for societies is, undoubtedly, an indispensable part of the effort to make these societies more egalitarian, solidary and integrated (Mello, 1991, p.13, our translation).

According to Kistemann (2014), Statistical Education, are configured as instruments for the formation of future generations, for the coexistence in a society with more equity and social justice (D'ambrosio, 2014; Kistemann , 2014). Thus, "it is the responsibility of Mathematics Education, in the figure of its representatives, to use education as a strategy to reduce social inequities and inequalities insofar as practices develop based

on the development of the criticality of learners" (Kistemann, p. 146, 2014, our translation).

In this sense, Skovsmose, Scandiuzzi, Valero and Alrø (2012) states that the teaching of Mathematics "is not only cognitive in nature, but also socio-political. The meaning given to learning is linked to the learner's social, political, cultural, and economic conditions and how he interprets them" (p. 235, our translation). D'ambrosio (2014) also admits, in speaking of formation for an uncertain future, that

> Preparing children to be proficient in obsolete math is to prepare them for the anguish of being marginal in the future because they will possess outdated knowledge. Avoiding this distress is an important resource of social justice. For me, social justice can be understood as an effort to meet the basic needs of a healthy life: freedom and choice; health and physical well-being; and good social relations, anchored in security, tranquility and respect for spiritual experience (p. 39, our translation).

Gutstein (2006) also attributes to the students themselves the importance of key participation in social movements. In addition, it points out that the ability to critically read the Mathematical world allows local and global struggles for justice, peace and true equality to develop (Gutstein, 2006, 221), in the sense of exercising citizenship that enable it to make decisions (Gal, 2002). Rosich and López (2007) and Skovsmose and Valero (2007) affirm that Mathematics can contribute to the formation of conscious and participative citizens, in a process of inclusion and not as a factor of school exclusion.

Moses & Cobb Jr. 2001 present Mathematics as a critical lever for social and educational progress, in a bias contrary to the conception of Mathematics as a culturally neutral, politically irrelevant science, and especially as an innate ability. Thus, mathematics becomes an appropriate and powerful tool for transforming oppressive ideology and promoting behaviors of self-consciousness and self-sustainability (Poling & Naresh, 2014).

Lesser (2007) observes that the understanding of statistical concepts refers to Social Justice. This is because understanding the occurrence of social inequalities - from differences or statistical patterns in groups - use mean or standard deviation concepts, for example as references in discussions; as well as interpreting or producing adequate representations from quantitative data enables the development in the subject of the capacity to act in the space that is inserted.

This literature review focused on research results which propose the interface between Mathematics Education, Statistical Education and Social Justice. This subsidized the discussion about this intersection in these fields of knowledge, which contributed to the perspective adopted in this paper. Then, the analysis method will be presented, as well as the analyzed corpus.

4. Methodology

The present research is characterized as qualitative (Minayo, 2010; Neuman, 2000), because it conforms "(...) better to investigations of delimited and focused groups and segments, social histories from the actors' perspective, relationships and for analysis of speeches and documents" (Minayo, 2010, p. 57, our translation).

In addition, due to the fact that one of the authors of this paper integrates the LeME team, the paper is characterized as a participant research, which occurs when researchers are involved (Gil, 2002). This type of method has been breaking with paradigms in relation to the non-involvement between the researcher and the object of study (Minayo, 2010; Neuman, 2000).

5. Research Corpus

The LeME team performed several records, among which were selected to compose the corpus of this research those that evidence the intention to promote Social Justice through the Statistical Literacy. In the seven years of the program, the group had been composed of more than 50 students, predominantly from Mathematics, Pedagogy, Literature, Geography, Biology, Physics, Chemistry and History, as well as other courses such as Visual Arts, Computing, Psychology, Engineering, Librarianship, Law and Administration.

These subjects, with pedagogical support of the graduate students and researchers of LabEst, throughout the Program, carried out records that generated the corpus of this research. This corpus, registered predominantly by these teachers in formation, contemplates reflexive diaries of actions developed in the statistical workshops offered in the CCMar and in some schools of the city of Rio Grande and its surroundings - which already have benefited more than 1,500 youngsters from 14 to 17 years in social and economic vulnerability.

It should be noted that the LeME workshops have been organized in a different way over the years, according to the demands of each vocational course to which the participants are linked or from each requesting school or community. In some semesters, six different workshops were planned, such as the first half of LeME and the current one. In other situations, the workshops have already been offered once, when scheduled to be in a single day, in some community or school. Besides having already been composed also by three, four or five workshops, but always with four hours in duration.

The records resulting from these meetings originate from the moments of the actions of the Program and are constituted by reflexive diaries made predominantly by the teachers in formation on the development of the activities. It is important to clarify these records were made individually, either collectively or collectively by the LeME team. In order to delimit the corpus of this study, we selected from the records, those in which it was possible to identify the evidence of the intention of the LeME team to promote Social Justice.

The detailed examination of these data was performed and is presented in the subsequent section, in the form of results and discussions, originating from these. These were based on the previous approach, based on the previous literature review presented, according to the methodological option described later.

6. Content analysis

To analyze the corpus, we opted for Content Analysis, which consists of a set of techniques for the analysis of communications - documents that are part of the corpus of the research. This methodology is organized around the following steps: i) organization of the analysis, ii) coding, iii) categorization, iv) inference, and v) computer processing (Bardin, 2010).

The first step is subdivided into three phases, being: a) pre-analysis; b) exploitation of the material; c) treatment of results, inference and interpretation. In the pre-analysis, a floating reading of documents is carried out, in order to know and establish familiarity with the documents. Next, the documents that will be part of the corpus are defined; formulates the hypotheses - provisional assertions that will be verified from the analysis - and the objectives - purpose of the research. In addition, the indexing of indices and the elaboration of indicators - marking elements that allow the extraction of the communication, the essence of its message - and the preparation of the material, that is, the transformation of the material by standardization and by equivalence (Bardin, 2010).

Considering this methodology, in this research, initially, a floating reading of the LeME records was performed. In order to compose the corpus, the ones that evidenced, in the researchers' view, the elements of marking: aspects that reveal the intentions of the LeME team regarding the promotion of Social Justice through Statistical Literacy.

In the exploration of the material, one has the process of codification, discount or enumeration, from rules previously formulated by the researcher. At this stage, the coding was done by means of colored markings on the corpus, in order to indicate the marking elements,

which correspond to the aspects that reveal an intention to promote Social Justice. These composed the excerpts that were submitted to the next stages of the methodology, with the appropriate discounts, that is, deletions of excerpts. These were then enumerated and sequentially numbered.

For the last phase of the pre-analysis, the treatment of the obtained results and the interpretation is developed, in order to make them significant and valid. In this case, one can use, for example, simple statistical operations, such as percentage, or more complex, such as factorial analysis (Bardin, 2010). In this research, it was decided not to perform quantitative operations from the corpus. Therefore, aware of the impossibility of covering the entire corpus and considering the length of the paper, selected excerpts were selected that were representative of the intentionality of promoting Social Justice, which were submitted to the next stages of Content Analysis.

In the second stage the codification is developed. This consists of transforming the raw data of the text so that it has a representation of its contents. In the codification one can perform the clipping techniques (choice of units), enumeration (choice of counting rules) and classification and aggregation (choice of categories) (Bardin, 2010). For this data analysis, since the discount and the enumeration were already, to a certain extent, contemplated in the previous step, at the moment only some adjustments have been made, such as the increase of discounts, among other cuts.

In this adequacy, the search was for evidencing the representations of Social Justice, from the selected excerpts, in comparison with the literature review. Thus, the first classifications and aggregations emerged, which gave rise to the categories - at which time it was possible to reorganize the choice of rules, that is, specific enumeration of counts for the categories that emerged.

In the third stage, the categorization is carried out by classifying characteristic elements of a group, by differentiation and, subsequently, by grouping according to gender, based on previously defined criteria. Thus, in the categories, are gathered the elements that have common characteristics. For this, some criteria can be used, being: semantic (thematic categories), syntactic (verbs and adjectives), lexicon (classification of words according to their meaning, pairing of synonyms and nearby meanings) or expressive (classification of the various language disorders) (Bardin, 2010).

For the categorization of the data of this corpus, we used semantic criteria - thematic categories from the theoretical perspective presented in the literature review, as well as lexical - classification of excerpt words with close meanings. From the interweaving of these two criteria, excerpts were grouped into two categories, being: social context and criticality.

To the excerpts that showed a concern of the professors to contemplate the social context in the activities developed in favor of the Statistical Literacy, was assigned the category "social context". This first category observed the social context as an aspect that demonstrates intention to promote Social Justice, in order to provide a teaching based on the social and cultural identities of LeME students (Gutstein, 2003).

About the excerpts that evidenced the relevance of the formation of critical thinking and opinion, Statistics as a tool to avoid social alienation and conviviality in society was attributed to the category "criticality". This category was chosen considering the intentionality, observed in excerpts, to promote the formation of critical subjects capable of interpreting statistical information (Kistemann, 2014).

Each excerpt was assigned a category (social context or criticality). These excerpts were identified by two consecutive numbers, separated by a dot. The first refers to the category and the second to the enumeration of the excerpt itself. In this way, we conclude the activity performed in the coding step (choice of counting rules).

In the fourth step, for the interpretation of results, inference is made, that is, a "logical operation, by which a proposition is admitted by virtue of its connection with other propositions already accepted as true" (Bardin, 2010, p. 41, our translation). The excerpts, when submitted to the analysis, at this stage, from the dialogue with the literature review related to Social Justice, allowed the demarcation of some results, which are described in the next section.

The computational treatment, that is, the automation of the data analysis process (Bardin, 2010), which would represent the fifth stage of Content Analysis, was not carried out in this research. According to Bardin (2010), this step is not recommended when the coding unit is extensive, in terms of space and time, as is the case of records made by the LeME team.

7. Results and discussion

In this section, we present the aspects that demonstrated the intention of the LeME team to promote Social Justice through Statistical Literacy. These aspects were identified during the Content Analysis (Bardin, 2010; Moraes, 1999), under the literature review approach, which resulted in two categories: social context and criticality, which are discussed in the following two subsections.

7.1. Social context

In this category, the analysis of the social context aspect is presented, which highlights the intentions of the LeME team to promote Social Justice through the Statistical Literacy, in order to provide a teaching based on the social and cultural identities of LeME students. In this bias, the perspective of Kistemann (2014) is adopted, for whom Education - in this case, Statistical Education - reveals itself as a strategy to reduce social injustices and inequalities. Table 1 shows excerpts from the corpus in which this aspect was identified.

Table 1 - Excerpts from the corpus relating to the Social Context Category

Excerpt 1.1 - "We bring example of paychecks ... something of great interest to the students, as we help them to read, understand, calculate and interpret, [...] students have been able to communicate with their parents, [..] .] they could see all the reality behind it ... we build different types of graphics …"

Excerpt 1.2 - "The aim of the project [...] is to provide students with learning tools that are easily applicable in their daily lives and that promote social equality through better understanding of data presented in graphs in the news, books and magazines …".

Excerpt 1.3 - "... the aim was to welcome, relax and bring students closer to the professors responsible for the development of the workshops, and to give young people the perception that Statistics are present every day".

Excerpt 1.4 - "[I, professor of LeME] presented some concepts of Descriptive Statistics, from contexts related to vocational courses".

Excerpt 1.5 - "We show that we all have certain differences, such as height, age, personality, but that is only given for statistics, since we are all human and in a certain way, we are all the same".

Excerpt 1.6 - "... create questions about a topic [of student interest] to later collect data in order to generate statistical graphs …"

Source: Records made by the LeME team

The excerpts presented (Table 1) were part of the corpus concerning the social context and present the intention of the LeME team to articulate students' daily life with the promotion of Statistical Literacy, considering aspects related to the identity, reality, and interests of these subjects served by the LeME.

Excerpts 1.4 and 1.6 show that the contexts related to vocational courses, as well as topics of interest to students, were included in the horizon of data collection, generation of statistical graphs and also in the presentation of Descriptive Statistics concepts. These contexts emerged from the vocational courses chosen by the students and also from themes that the subjects themselves chose to carry out their statistical research.

These excerpts represent the intention of the LeME team to contemplate the context of these students, so that considering individual choices, according to Cotton (2001), shows that Social Justice is associated with the rights of each human being. The possibility of reflecting on the profession, as well as on topics of interest itself, presents

itself as an opportunity for subjects to know and take ownership of the conditions of their own lives, as well as of the socio-political movements that occur in the spaces in which they are inserted (Gutstein, 2003) and, consequently, socio-political consciousness can be developed (Freire, 2016).

Other excerpts in which the social context aspect is evidenced, in the intention to promote Social Justice through Statistical Literacy, are 1.1, 1.2 and 1.3. These include graphs presented in the media, examples of paychecks and still other statistics present in the routine. Contemplating such everyday issues, of student interest and applicable to their lives, in order to perform and interpret statistics, presents itself as an alternative to social exclusion, especially for aiming to avoid the anguish related to learning obsolete and outdated content (D'ambrosio, 2014). This anguish is avoided by the fact that the context addressed, evidenced in these excerpts from the LeME team's records, refers to the social context of these subjects.

In Excerpt 1.5, it is possible to see that the LeME team also demonstrates that data related to the subjects themselves - such as height, age, personality characteristics - are aids to statistics. In this paper, Gutstein (2003) have shown that statistics, as well as mathematics, do not only deal with cognitive elements by nature but also socio-political elements (Skovsmose et al., 2012).

The possibility of assigning meaning to the characteristics that identify it can make them realize that such data, while revealing elements relating to the individual, are important for delineating official statistics, as well as making them reflect that their choices, be they the number of children, the profession, among other possibilities, will interfere in official statistics. Therefore, considering this aspect enables young people to believe that it can make a difference in the world (Gutstein, 2003), in a way that the meaning attributed to learning is linked to the social, political, cultural and economic conditions of the learner (Skovsmose et al., 2012).

In order to promote Statistical Literacy, by providing the opportunity for students to develop the ability to critically read statistical information, through information from their own daily life, the social context presents itself as an aspect that evidences the intention to promote Social Justice.

7.2. Criticity

This category indicates the concern of the LeME team with the development of student criticality. This intention was revealed in the records, presented in excerpts (Table 2). In them, it was possible to identify the intention to promote the formation of critical thinking and opinion through Statistical Literacy. This subsection aims to highlight excerpts and discuss them, in order to substantiate this assertion.

Table 2 - Excerpts from the corpus relating to Critical Category

Excerpt 2.1: "It is very gratifying for us, trainee teachers, to give LeME students the opportunity to develop this valuable knowledge [...], which is needed to meet the demand for information they receive every day. [...] Being able to interpret and reflect, in relation to what is being read, is fundamental for the formation of critical thinking and the opinion of these young people".

Excerpt 2.2: "On the experience with this contact with the youth: it was possible to perceive the importance of presenting activities that aimed at the professional and personal development of the citizens. Knowing how to interpret information is increasingly necessary not to fall into social alienation".

Excerpt 2.3: "... we meet the demand of the labor market, which requires professionals who have a critical view, so that they can observe, reflect and interpret graphs, tables and statistical surveys; in short, that they are not only literate but statistically literate".

Excerpt 2.4: "... analyze the data collected by them and transform the results into texts. These were reported in the form of a newscast called LeMEcional Journal".

Excerpt 2.5: "because we helped them to read, understand, calculate and interpret, [...] students were able to communicate [...] they could see all the reality behind it ... we built several types of graphics …"

Source: Records made by the LeME team (our emphasis)

The excerpts selected to represent the corpus concerning the criticality aspect present the concern of the LeME team in forming critical subjects who are able to observe, interpret and reflect. This intention is revealed in excerpt 2.1, in which the teacher in training recognizes the importance of the development of the ability of interpretation as a requirement for the process of opinion formation, which can promote the social protagonism of the students. In this sense, it can be considered that these registers evidence the search for constitution of conscious and participative citizens, with socio-political consciousness (Gutstein, 2003), characterizing itself as a process of social inclusion.

Another excerpt that attempts to develop the ability to interpret statistical information critically to an active and agential attitude is 2.4, in which the teacher in training states that students turn the results into texts and create a newscast. This process of transforming results of statistical research into texts, to be shared with the other students, reveals the intention to provide situations in which they exercise the authorship and the agency.

This is presented itself again as an alternative for young people to believe that they can make a difference in the world (Gutstein, 2003), through the development of the sense of agency. Lesser (2007) also emphasizes the development of the sense of agency as a possibility for the subject to act in the space in which it is inserted, understanding and combating social inequalities, besides participating in discussions, interpreting and producing information, considering quantitative data.

The teachers in training, in section 2.2, demonstrated their intention to present activities that enable students to interpret statistical information as a way to avoid "social alienation". Wodewotzki, Jacobini, Campos and Ferreira (2010) emphasizes that:

> teaching of statistical content should always be accompanied by the objective of developing students' criticality and engagement in political and social issues relevant to

their reality as citizens living in a democratic society who are fighting for social justice and a humanized and de-alienated environment (Wodewotzki et al., 2010, p. 74, our translation).

Excerpt 2.3 reveals the intention to train professionals to have a critical view, as it is a demand of the labor market. LeME staff records indicate that this critical view has the purpose of enabling subjects to observe, reflect and interpret graphs, tables and statistical surveys. Thus, in the area of Statistics, as Moeses and Cobb Jr. (2001) identified in the area of Mathematics, the criticality aspect becomes a resource for the social progress of the subjects.

In this sense, the development of criticality is provided through the Statistical Literacy (Gal, 2002), as it empowers citizens to exercise professional and citizenship. In this case, Statistical Education, far from being only a tool for technicians who produce statistical data, integrates the daily routine of professional and citizen exercise, in which the subjects will be required to interpret and make decisions based on this information (Batanero, 2001).

Records by the LeME team, evidenced by excerpt 2.5, demonstrate the intentional quest to provide students with the ability to interpret, communicate, and perceive reality in a perspective that reveals a concern with critical thinking formation.

In this way, teachers of the LeME, in seeking a link with reality, present Statistics as a critical lever for social and educational progress, opposing their view as culturally neutral and politically irrelevant, approaching the results of Moses and Cobb Jr. (2001).

In addition, the stated intention to develop reading, understanding, calculation and critical interpretation skills in students refers to the promotion of Social Justice through Statistical Literacy (Gal, 2002). In this way, Statistics, as well as Mathematics, presents itself as a strategy for the formation of conscious, critical and participative citizens, in an inclusion process, and not as a factor of school and social exclusion, as indicated by Skovsmose and Valero (2007). Therefore, Gutstein (2006) points out that the development of the capacity to read the world critically allows local and global struggles for justice, peace and true equality to develop.

These elements, related to criticality, now stand out, allow us to perceive that Statistics, like Mathematics (Poling & Naresh, 2014) is revealed as a tool to transform oppressive ideology to promote criticality. This criticality presents itself as the other aspect that shows, in addition to the social context, the intention to promote Social Justice through Statistical Literacy.

Thus, according to Kistemann (2014), Statistical Education, as well as Mathematical Education, can become an "instrument of broad formation, of rights struggles for citizenship and of social emancipation, preparing individuals and society for responsibility to construct, collectively, a project of inclusion and social justice" (p. 147, our translation).

This reasoning shows that the findings related to criticality can be considered as an aspect related to Social Justice, in the sense that, by enabling the subject to read critically the world around him, it is possible to develop local and global struggles for justice, for peace and equality (Gutstein, 2006).

8. Final considerations

The present paper aimed to identify the aspects that evidence the intention to promote Social Justice through the Statistical Literacy, based on the records made by the LeMe team. The pre-analysis of these records allowed the constitution of a corpus, restricting itself to those who evidenced such intention. Therefore, the Content Analysis of this corpus, in dialogue with the literature review related to Social Justice, allowed the demarcation of some results, which legitimize the social context and criticality as aspects that promote Social Justice through Statistical Literacy. In other words, the intention was to promote Social Justice, through the Statistical Literacy, in excerpts from the corpus that contemplated the social context and sought to promote criticality.

The discussion of these results with reference to Social Justice, in its interfaces with Education, Mathematics Education and Statistics, has generated arguments that endorse and legitimize the social context and criticality as aspects that promote Social Justice through Statistical Literacy.

The findings of this study may enable graduate students, who act as LeME teachers, as well as graduate students and researchers from LabEst and the Research Group on Statistical Education - FURG / CNPq, to rethink and propose pedagogical practices that broaden the scope of these two aspects. In this way, it is possible to observe an inseparability between research and extension, so that both complement each other.

In addition, this research can contribute with other professors and researchers, interested in the area of knowledge that approximates Social Justice and Statistical Education. Specifically for pointing out the Statistical Literacy as a means of promoting Social Justice, by highlighting possibilities of contemplating the social context and strategies to promote criticality, in order to avoid social exclusion.

In this perspective, when it comes to Statistical Education, Statistical Literacy, when contemplating the social context and criticality, presents itself as an alternative to social exclusion, so that it constitutes a strategy for the promotion of Social Justice.

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