# Daily life traits in arithmetic word problems: a glance at 1950s school notebooks

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## Abstract

The paper focuses on the representations of everyday life featured in arithmetic word problems studied in elementary schools in the 1950s in the state of Rio Grande do Sul, in the south of Brazil. The official guidelines at that time recommended the study of daily life problems, elaborated by the teacher or the students, that evoked situations similar to those experienced or devised by the children. The analysis of the notebooks of two fourth graders in the 1950s shows partial compliance with the guidelines. Math word problems that were to connect students to everyday activities in local contexts reveal the teachers' intentions to reconcile preparation for practical life with the exercise of arithmetic operations studied in class, but these are interspersed with improbable scenarios and wordings referencing artificial contexts. Word problems featuring "daily life" situations that children might experience are few; in the text of most word problems, the teachers turn to a collection of issues common to the school tradition, introducing in them local traits and colors with the purpose of lending them credibility and familiarity. In both sets of notebooks, the arithmetic word problems mimic real life but are formulated and solved within the confines of the school itself; in that sense, they can be considered school creations.

Keywords: history of mathematics education, school notebooks, elementary school, word problems

# Introduction

In the 1920s and 1930s in different regions of Brazil, elementary school programs were reformed, resonating ideas of the Progressive School, referred to in Brazil as Escola Nova<sup>1</sup>. Mathematics and arithmetic word problems, in particular, occupied a prominent place in these programs, allegedly to prepare pupils for real life situations (Carvalho, Silva, Sant'Ana, Fernandes, & Santana, 2016; Almeida & Leme da Silva, 2014).

In the southern state of Rio Grande do Sul, new programs were enacted in 1939. According to their guidelines, the then usual practice of solving lists of problems of the same type, drawn from textbooks, should be abandoned. Instead, the teacher or the pupils should formulate arithmetic problems similar to or extracted from everyday life. The situations evoked were to be familiar to the children. Therefore it was necessary to consider the students' schools, their out-of-school daily lives,

<sup>1</sup> See Vidal (2013). Following this designation, we will use the adjective *escolanovista* to refer to the ideas propagated by this broad educational chain.

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their ages, the urban or rural environment of the school location, traces of the local culture, and other aspects. Thus it was expected that teachers would have autonomy and take the initiative in the selection of themes and situations, in the choice of data and writing, or in the revision of arithmetic word problem statements.

How were these guidelines considered, interpreted, carried out, or even disregarded by teachers? How were the problems presented to the pupils or which problems did they themselves formulate? What were the contexts their statements dealt with, or how was everyday life represented in these problems?

As Viñao (2008) argues, access to students' schoolbooks can give us clues about the curriculum practiced in the classroom. For example, notebooks can be elucidative with regards to the frequency with which a certain type of activity is performed or the language or examples evoked by the teacher in addressing a particular topic of the program.

The use of school notebooks as a source, however, is not a widespread practice among researchers in the History of Mathematics Education. One reason for this is the difficulty of accessing collections of notebooks that can be considered representative of teaching in a given level, time and region. Another possible explanation is that few surveys have focused on mathematics teaching practices (Ackerberg-Hastings, 2014).

Reflecting on studies carried out in Brazil, Leme da Silva and Valente (2009) argue that students' notebooks are very rich documents. However, the effort to set up shareable collections of notebooks is incipient. Rios, Búrigo, Fischer, and Valente (2017) present an overview of ongoing research using as a source the digital collection<sup>2</sup> organized by GHEMAT (History of Mathematics Education Research Group in Brazil).

In this article, we take as sources two notebooks belonging to that collection, used by pupils in the fourth grade of elementary school in the 1950s. We present considerations about the approach of arithmetic word problems in the classes these pupils attended, confronting notebooks' excerpts with the official prescriptions about the subject.

# The official prescriptions on arithmetical problems

In Brazil in the 1930s, the prevailing autonomy of the states gave way to the centralization of power by the Vargas federal government, aggravated by the establishment in 1937 of the authoritarian regime known as Estado Novo. In this timeframe, several policies for the modernization of culture and education were implemented,

<sup>2</sup> The collection is available online at https://repositorio.ufsc.br/handle/123456789/160300.

including the creation of the National Institute of Pedagogical Studies (INEP) in 1938. One of the roles of INEP was "to provide technical assistance to state, municipal, and private education" (Decree n. 580 of 1938).

The new curriculum of Rio Grande do Sul was prepared in the midst of this centralizing trend. Its wording fell to a committee of teachers and graduates of the Normal School of Porto Alegre, the leading state institution dedicated to the training of primary school teachers; Lourenço Filho, then president of INEP, revised the text<sup>3</sup>.

Decree n. 8020 of 1939 established the programs which were valid for all, mandatory even for schools maintained by communities of descendants of German and Italian immigrants who, until then, had enjoyed curricular autonomy. In addition to the contents that should be studied in each grade of the primary course, the Decree stipulated the purposes and guidelines for the study of each discipline (Decreto n. 8020, 1939/1957).

In the mathematics section, the item "arithmetic problems" appeared at the end of the list of contents for each grade, as an activity that should involve the use of other knowledge (numbers, operations, measures).

The guidelines for the study of arithmetic word problems reiterated recommendations that these problems should be "formulated by the teacher or the student" (Decreto n. 8020, 1939, p. 85), taking advantage of "situations arising in the life of the student or the class" (Ibid., p. 96), and

[...] arranged by the teacher to present the mathematical facts seized in the forms capable of occurring more frequently in life; it is advisable to get the students to identify themselves with the characters presented in the problem<sup>4</sup> (Decreto n. 8.020, p. 96).

The writings were to evoke or replicate real life, involving

data taken from the child's experience in the environment that surrounds him/her: spending on meals, clothing, transportation, school supplies, etc., using price lists organized or collected by students, advertisements, etc. (Ibid., p. 85).

The problems could be inspired by another subject's contents, games or occasional activities, such as excursions, visits, or projects. But with the situations evoked being quite varied, it was expected that the pupil would

<sup>3</sup> The program was written by Graciema Pacheco, Maria Fialho Pereira, and Marieta da Cunha e Silva, and reviewed by Olga Acauan Geyer (Novo programa de ensino..., 1939).

<sup>4</sup> All translations from Portuguese to English are the responsibility of the author. The originals can be consulted as they are available online.

[...] express his thoughts with clarity, order, and neatness, though not sacrificing these in favor of the most essential quality of correct and quick responses (requiring, for example, that the pupil should record all the calculations, even those done mentally or applying a systematic analysis of all the problems) (Ibid., p. 107).

Traces of 'escolanovista' or Progressive School thought are clear in these guidelines that value, on one hand, previous experiences and pupils' involvement and, on the other, the acquisition of correct, fast, and effective reasoning. In particular, it is possible to identify resonances of Edward Lee Thorndike's writings and, more precisely, those of his manual *The New Methodology of Arithmetic*, published in Portuguese in 1936 by Editora Globo in Porto Alegre, capital of the state of Rio Grande do Sul.

In this manual, Thorndike argues that, concerning arithmetic problems in primary school,

[...] every problem should preferably (1) address situations that are likely to occur in real life many times; (2) be treated in the way they would be in practical life; (3) be presented in a way neither much more difficult nor much easier to understand than they would be if presented to the pupil's senses in reality; (4) awaken, to a certain extent, the same degree of interest that follows the resolution of the problems encountered in the actual course of their activities (Thorndike, 1936, p. 153).

Nevertheless, it is widely known that an emphasis on approaching problems similar to or drawn from reality is not exclusive to Thorndike's work. For instance, concurrent appeals of the same type were frequent in the official French guidelines (D'Enfert, 2011).

## The guidelines disseminated in the official pedagogical journal

Soon after the new programs were determined, an apparatus was set up in the state of Rio Grande do Sul to "monitor the progress of work in educational establishments" (Peres, 2000, p. 129). This apparatus was coordinated by the Educational Research and Guidance Center (CPOE), an agency of the Department of Education created in 1942, which brought together so-called education technicians, primary or normal teachers who had undergone special training in education (Quadros, 2006).

The CPOE took on the roles of production, dissemination, and evaluation of the implementation of the official guidelines for primary education (Quadros, 2006). One of the instruments for disseminating these guidelines was the pedagogical journal *Revista do Ensino*, which, after a nine-year interval, had its publication resumed in 1951. Its yearly eight journals were widely distributed annually to elementary schools of the state (Bastos, 1997).

The first issue of the journal, published in 1951, already contained an article dealing with arithmetic word problems written by a CPOE member, Suelly Aveline (1951). Consistent with the precept that arithmetic problems should take advantage of "situations arising in the life of the student or the class" as established by Decree n. 8020 (p. 96), the article presents suggestions of problems for each elementary grade related to seed and tree seedling planting, activities to be carried out by the pupils.

In 1954, the newspaper published an article by Sydia Sant'Ana Bopp, also a member of the CPOE team. Unlike the previous article, which included proposed activities, this one presented theoretical considerations and general orientations on the approach of arithmetic problems in school with questions such as "Why do our children find so much difficulty in the learning of mathematics? What should we do to help facilitate the child's reasoning, ultimately leading him or her to solving problems?" (Bopp, 1954, p. 6).

In the same vein, the author considered that one of the main explanations for children's difficulties in their resolution was the presentation of

[...] unreal problems, those external to childhood and that in no way can be experienced by the child. If the reasoning is based on observations, how are we going to offer the children problems that do not fit their experiences? (Ibid., p. 6).

From this evaluation, the author reiterates and details the Decree guidelines, identifying situations and contexts that could inspire the formulation of a problem's wording:

All the activities at school and in the private life of the child offer opportunities for problems: attendance, lunch, school accounting, mail, bank, library, class notes, etc. Problems about school lunch, the price of food, with the possibility of making comparisons with older tables; problems with the price of paper, books, etc., problems with Brazilian import and export trade, historical dates, tram ticket expenses, health care, teeth treatment, etc. (Bopp, 1954, p. 7).

We see that Bopp's (1954) article conveys a fairly elastic interpretation of what would be "child-experienced" problems, including references to the bank and typical school subjects such as historical dates. Furthermore, references to money, costs, and prices dominate the above-mentioned contexts. In this respect, the guidelines that were announced as innovative seem to replicate those traditionally present in textbooks.

Other articles dealing with the topic continued to be disseminated throughout the decade and would reiterate the diagnosis of the difficulty and the precepts of the reliability of the word problem statements and the children's familiarity with the situations evoked (Carvalho *et al.*, 2016).

The CPOE's reiteration of these evaluations and precepts suggests that the team blamed the teachers and their practices for the pupils' difficulties with solving arithmetic word problems.

In a visit to Rio Grande do Sul in the 1950s for a study commissioned by INEP, Roberto Moreira (1955) found, based on interviews and classroom observations, that there was "no correspondence between the guidelines for the implementation of school programs and actual practice within the classroom" (Ibid., p. 129). The practice of active methods was, according to the author, infrequent, as the teachers emphasized memorization and the mechanisms that would be tested in the exams to which the pupils were subjected at the end of each year.

### The school notebooks of Juvenal and Gladis

Since the 1990s, school notebooks have been treated by educational historians as a source and as a research object. To the topic addressed here, it should be noted that school notebooks are rich in evidence of past school practices.

As Viñao (2008) warns us, it is not a question of taking the notebooks as portraits of the classes they witness: they do not contain records of gestures, oral communication (with the exception of dictations), games, dramatizations; according to the use and purpose assigned to the notebook, it may contain a somewhat accurate record of what the teacher dictated or wrote on the chalkboard and of the students' written activities. In addition, it should be noted that notebooks are not only products but also producers of school culture: the use of notebooks as a support for durable records (different from, for example, scribbles on the blackboard) enable and favor certain practices; learning to use the notebook or producing certain writings becomes an additional purpose of the school.

Chartier (2007) also observes the risks of anachronism in the analysis of notebooks because when we find records of activities that seem familiar to us, we tend to infer that they were performed as they appear to us in the memories we keep from our own school life, just as we tend to perceive activities that were not common when we were students or teachers to be archaic.

It would be necessary to analyze a large number of notebooks to infer from them about the school culture at a given time and place. In this paper, we deal with only two students' notebooks that were used in the fourth grade of primary education by their authors in the mid-1950s. This approach is exploratory: from the arithmetic problems found in these notebooks, we intend to raise some reflections to be considered in more extensive investigations.

The first notebook belongs to Juvenal Rosa Nunes and was used in 1954 when he studied in the Grupo Escolar Ramiz Galvão; the others comprise a set of four notebooks belonging to Gladis Renate Wiener, used in 1956, while she studied at the Colégio Farroupilha.

Grupo Escolar Ramiz Galvão was a public school of the state network located on the outskirts of the city of Rio Pardo, in the interior of Rio Grande do Sul. The municipality, located in a region dedicated to cattle raising and rice cultivation, had only 40,000 inhabitants in 1950 (Fundação de Economia e Estatística, 1981). The school was inaugurated in 1938 as part of a major commemoration of the 50th anniversary of the abolition of slavery in Brazil.

Colégio Farroupilha was a private school, founded in 1886 by a charity and maintained by entrepreneurs who were descendants of German immigrants. It was located in the city center of Porto Alegre, the main industrial and commercial center of the state with about 400,000 inhabitants in 1950 (Fundação de Economia e Estatística, 1981).

The difference between the literacy rates in the two populations reveals the disparity in schooling processes at a time when the school was strongly associated with urbanization in Brazil. In 1950 in Porto Alegre, 80% of people aged five years and over stated that they could read and write; in Rio Pardo, the index was only 48%. <sup>5</sup> However, schooling rates were rising: Juvenal recalls that, in the Grupo Escolar, the classes were offered in three condensed periods to meet enrollment applications.

The teacher of Juvenal's class was a young woman named Marina Celeste da Cruz<sup>6</sup>. At that time, the city of Rio Pardo had a first cycle Normal School, which offered the equivalent of a middle school education, but with a teacher training component; but since the grupos escolares welcomed the most qualified teachers, it is probable that Marina held a higher diploma.

Gladis' teacher was Irene Marta Fischer Petrick, a graduate of Colégio São José, a Catholic institution run by nuns of German origin, which offered teacher training equivalent to first cycle Normal School. Irene began teaching at Colégio Farroupilha in 1938 and was an experienced teacher in the 1950s (Jacques, 2015). Her surname

<sup>5</sup> *Grupos escolares* offered graded schooling provided by graduated teachers. The expression *grupos escolares* can be roughly translated as "school grouping". In fact, the first schools named as *grupos escolares* came out of the assembly of former socalled "isolated schools".

<sup>6</sup> According to the testimony given to Nicolas Giovani da Rosa in January, 2017, and data collected from the school's website: <a href="http://escolaramizgalvao.blogspot.com.br">http://escolaramizgalvao.blogspot.com.br</a>.

and background suggest that her entry and tenure in the school were in some way related to her belonging to and identifying with the Teuto-Brazilian community.

Juvenal reports that he entered primary school at age thirteen; before that, he lived in a rural location that had no schools. He was probably sixteen when he entered fourth grade. He attended the classes of the second period, which began at eleven o'clock in the morning, and he worked in the morning and in the afternoon, that is before and after school. Juvenal also reports that he left school "before finishing fourth grade, because of work; I had to work<sup>7</sup>."

Gladis was ten when she attended the fourth grade of Colégio Farroupilha. Her parents were Jewish German immigrants who arrived in Porto Alegre in 1937; they were trained podiatrists and owners of a company manufacturing orthopedic products. After primary school, Gladis attended secondary school at the same institution; she studied mathematics and later became a university professor.

For the working class, the class to which Juvenal belonged, the only accessible school was the primary school; in fact, most students in the state network never progressed beyond the first grade, and not even a third of them completed the fourth grade (Cunha, 1980). The children of the middle or upper classes, in turn, were encouraged to pursue studies, take competitive exams to enter public second-ary schools, or attend private schools, as was the case with Gladis.

In both schools, teachers were required to comply with the state program of 1939, which was still in force. For the fourth grade, the program prescribed the study of these items: multiples, divisors, and divisibility rules; comparison and simplification of fractions, reduction of fractions to common denominator; decimal fractions, multiplication and division of decimals; metric system; notion of surface and area; perimeters of quadrilaterals and triangles; problems, including "more detailed oral analysis and writing" (Decreto n. 8020, p. 107).

But despite the curriculum being the same, the settings of the two schools were quite diverse, as was the composition of the student bodies. Considering these differences, it can be assumed that the objectives Juvenal's and Gladis' primary teachers assigned to the teaching of mathematics were also diverse.

The uniformity of contents and the dissimilarity of the contexts make the examination of the Juvenal and Gladis notebooks particularly interesting. We presume that the notebooks can give us clues about how the prescribed curriculum was interpreted or how it was fulfilled by the two teachers. Considering the practices in the primary school of Rio Grande do Sul at that time, we can assume that the same

<sup>7</sup> According to the testimony given to Nicolas Giovani da Rosa in January, 2017.

tasks were assigned to all students in each class, with each student performing them individually using his or her notebook.

It is necessary to remark that we know little about the autonomy of teachers in each of the schools or the degree of control exercised by the administration, parents, or senior supervisory bodies. We also know little about the sources of inspiration or didactic materials to which the two teachers had access. We do not have access to their class diaries or autobiographical documents. So the focus is not on analyzing the planning processes of their classes, but rather on considering what the notebooks tell us about the tasks assigned to students.

## The place of arithmetic problems in the notebooks

Viñao (2008) notes that schoolbooks can take many different forms according to the uses attributed to them.

The notebook Juvenal kept as a memento of school days was entitled "my diary." The first records are from March 15, 1954, and continue for 6 months until September 29, possibly the date he left school. The notebook contains records of various subjects. He explains:

We wrote each subject in one notebook; in another notebook, then at night at home, we wrote it out to the diary. We transcribed it<sup>8</sup>. Each one had his own diary.

Juvenal's diary, therefore, presents a revised and probably summarized version of classroom activities. Mathematics activities occupy an important place in the notebook because, according to him, "what she taught the most was mathematics, which we needed more, for in mathematics one has to show how to do it, how to set up the calculation."

In the fourth grade, Gladis used four notebooks entitled "Arithmetic," which comprised two sets; the presence of definitions and explanations in two of these indicates they were used to record class lessons, and the other two-notebook set was used for homework. The first records are from March 5, 1956, and the last is from December 4 of the same year.

The mathematics portion of Juvenal's notebook and Gladis' notebooks contain varied definitions, rules, types of exercises, and other tasks. We classify the activities that involve the recording and interpretations of verbal utterances containing numerical data, and the production of an answer obtained from calculations involving

<sup>8</sup> In fact, Juvenal uses the expression "passar a limpo", which could be translated as "writing a neat and revised copy of".

those data as arithmetic problems. According to this definition, we include in the "arithmetic problems" category not only statements that mention extra-school contexts, but also those involving questions about arithmetic operations, geometric figures, or themes of other disciplines.

In the discussion that follows we focus on the text or the wording of arithmetic problems, and from them, we discuss the place of those problems in school activities.

First, we note that arithmetic word problems are common activities in Juvenal's and Gladis' classes. In Juvenal's notebook, 81 problems are recorded over a period of 26 weeks; in Gladis', 90 problems, over a period of 37 weeks. In Gladis' notebooks, the statements are followed by detailed resolutions; in Juvenal's notebook, the answers are, in some cases, accompanied by calculation algorithms.

It is possible to note that the inclusion of different types of numbers and units of measure in word problem statements correspond largely to the order in which they are presented and mobilized in other tasks.

In Juvenal's and Gladis' notebook recordings in March and April, nearly all problems involve whole numbers exclusively - including cases of monetary values represented by two zeroed decimal places.

In Juvenal's notebook, the topic "ordinary fractions" appears at the end of April and the first problem involving fractions (a half and a quarter of certain amounts) appears in early May. The first computation algorithms involving decimal numbers appear at the end of April, and the problems involving decimal numbers appear most frequently beginning mid-May.

In Gladis' notebooks, the topic "decimal numbers" appears in mid-June; the first problems involving decimals appear at the end of the month, and they are used frequently beginning in September. The metric system is introduced in mid-September with problems involving measures of length, volume or weight; hence decimals appear then most frequently.

The logic that organizes the approach of problems according to the types of numbers used in statements is interrupted here and there by commemorations of patriotic dates in compliance with the prescribed interaction between the study of mathematics and history. In Gladis' notebooks, ten (10) problems are related to patriotic dates that recall the death of Tiradentes (considered a martyr of the struggle for the country's independence), the arrival of German immigrants to Brazil, the birth of Santos Dumont (considered the patron of Brazilian aviation), and the proclamation of the Brazilian Republic. In these problems, only whole numbers appear.

# Daily life in school arithmetic problems

Considering the precept that word problems should be plausible and have the possibility to be "experienced by the children," what contexts do they evoke? What were the situations that the teachers considered worthy of being portrayed in these problems?

In both Juvenal's and Gladis' cases, most problems involve calculations with money - purchase and sale, salary, debt or savings - or measures of length (including distance, height), area, volume, capacity or weight expressed in units of the metric system. In Juvenal's notebook, 70 of the 81 problems involve money or measures of length, area, volume or weight; in Gladis' notebook, 57 of the 90 problems fall into these groups. Table 1 presents the distribution of problems according to this initial classification.

	Juvenal's notebook	Gladis' notebook
Problems involving money, but not involving measures of length, area, volume or weight	46	18
Problems involving money and measures of length, area, volume or weight	3	18
Problems involving measures of length, area, volume or weight, but not involving money.	21	21
Problems that do not involve money or length, area, volume or weight	11	33
Total number of arithmetic problems	81	90

Table 1. Distribution of arithmetic problems in notebooks

Among the problems that do not involve money, an important portion deals exclusively with Arithmetic or Geometry contents, with no reference to extra-school contexts. Table 2 presents the distribution of problems not involving money according to their connection with school contents, considering patriotic dates as school subjects.

Table 2. Distribution of problems not involving money

	Juvenal's notebook	Gladis' notebook
Problems involving only Arithmetic contents	0	10
Problems involving only Geometry contents	12	0
Problems involving patriotic or historical dates	3	10
Problems involving extra-school contexts	17	34
Total number of arithmetic problems not involving money	32	54

Problems involving money can, in turn, be classified into large groups: buying or selling food; purchasing items of clothing or materials necessary for their manufacture, such as fabric, buttons, thread, wool, ribbon; purchase of school supplies; rides, parties, and toys; receiving wages; variation of savings or debt; giving to charity or sharing of money. In Juvenal's notebook, we also find six (6) statements that we consider related to rural life, involving, for example, the purchase of wire for a fence, the purchase of a tractor or the sale of firewood obtained by the cutting of trees. Table 3 presents the distribution of problems involving money according to these groups.

	Juvenal's notebook	Gladis' notebook
Problems involving buying or selling food	11	3
Problems involving items or materials for clothing	9	14
Problems involving purchase of school supplies	5	1
Problems involving wages	3	2
Problems involving variation of savings or debt	4	2
Problems involving charity or sharing of money	3	2
Problems involving rides, parties or toys	5	5
Problems related to rural life	6	-
Other problems	3	7
Total number of arithmetic problems involving money	49	36

Table 3. Distribution of problems involving money

Most word problems involving monetary values use simple texts, from two to six lines. In most cases the problem involves a question of calculating change, profit, or the price of an amount of a certain product (beans, butter, milk, wine, cloth, wool, and others), given the price of another known amount, this is, under the assumption of proportionality. In the notebooks of Juvenal and Gladis, it is observed that the resolutions - certainly oriented or expected by the teachers - apply the strategy of calculating the unit value. For example, in the problem "7 meters of calico cost Cr\$ 84.00. How much is <sup>1</sup>/<sub>2</sub> meter?," Gladis solved the problem in her notebook by calculating the price of one meter, and then the price of a <sup>1</sup>/<sub>2</sub> meter of fabric.

As for problems not involving monetary amounts, the largest share contains measurements of length, area, volume, capacity or weight. As shown in table 1, these number 21 in each of the groups of notebooks.

The concern to reference situations likely to be "lived" by the children, as determined by the program, is evident in the word problems dealing with toys, parties, outings or school supplies. In Juvenal's notebook, there are five (5) problems related to the traditional and popular feast of São João<sup>9</sup>, including the purchase of food, ornaments and various types of fireworks. The utterances of these problems are extensive; one of them holds two halves of pages including a price list, as illustrated in Figure 1.

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Fig. 1. Juvenal Nunes' notebook, fourth grade, 1954 (pp. 104-105).

In the following statement, one identifies the teacher's intention that the students identify themselves with the "characters of the problem," as the program recommended: "The students of the fourth grade will buy, to celebrate the Night of São João, one box containing 5 dozen and a half rockets; 2 dozen of fosforinas; 5 estrelinhas; a tenth of a ream of tissue paper to make balloons. To pay this expense, they will give the seller a note of Cr\$ 1,000.00. How much will they receive for the change?" In re-reading the notebook, Juvenal recalled the fireworks: fosforina was "a little bomb, like a thicker match, with gunpowder, which one would light in the matchbox and throw away; it was not too noisy." And estrelinha he described as "a stick that sparkled little stars, like sparks<sup>10</sup>."

The richness of details, which coincide with Juvenal's memories, suggests that the problem was drawn up by the teacher, perhaps even with the participation of the students, seeking to explore an activity familiar to them.

<sup>9</sup> Celebrated on June 24 around a bonfire, with songs and customs of Portuguese origin.

<sup>10</sup> According to the testimony given to Nicolas Giovani da Rosa in January, 2017.

In one of Gladis' notebooks, we find four (4) statements that reference a tour of the school pupils to the newly opened Railroad of Dreams. The numbers extol the greatness of the work, with no concern for presenting real data: "The engineers who designed the Railroad of Dreams needed 15,000 hours to complete that marvel. How many days were needed to accomplish this feat, calculating that they worked eight hours a day?"

Some statements try to combine the celebration of historical dates with references to the universe of children: "Grandpa says he was seven years old when the Brazilian Republic was proclaimed. How old is Grandpa now?"

In both groups of notebooks, we find references to the local context. In Juvenal's notebook, there are nine (9) problems that refer to activities practiced on small farms, which were common in his school environment: growing vegetables, poultry, logging, and cultivation of fruit trees or selling fruit common in the region - papayas, bananas, avocados, oranges, apples, pears, and quinces. In Gladis' notebook, we find references to names of banks and stores in Porto Alegre, the tram, and the urban bus: "For a Vila Jardim bus that makes 8 round trips to the market and carries 42 passengers each time, what revenue should be generated each day, if the fare is Cr\$ 3.50?"

The frequency of buying/selling word problems, references to local contexts, historical dates, and school activities as shown in Tables 1, 2 and 3 correspond to the guidelines published in the aforementioned Bopp's article (1954). From such connections, however, one can not conclude that statements originated from "situations arising in the life of the pupil or the class," as it was prescribed then by the current program (Decreto n. 8020, 1939, p. 85).

Some of the statements involve data implausible in real life, such as a problem that asks for the price of 1 centimeter of fabric in Gladis' notebook, and a statement in Juvenal's notebook that reports a purchase of 15 kilograms of sugar in the grocery store by a girl. Other statements present situations that do not constitute reallife problems, such as calculating the sum of teacher and pupil weights in Gladis' notebook, or the difference between the height of two fences in Juvenal's notebook. Furthermore, extra-school contexts largely refer to activities of adult life, such as shopping, work, saving.

#### **Final considerations**

As pointed earlier, our analysis of Juvenal's and Gladis' notebooks presupposes the practice of simultaneous teaching, in which a teacher addresses all students, teaching the same contents and proposing the same tasks. It also presumes the regular and daily use of the notebook for recording the pupil's writing activities. Under these assumptions, which are historically dated (Ackerberg-Hastings, 2014), the study of the two notebooks shows a partial compliance with the official guidelines on the approach to arithmetic word problems.

The ordering of the problems according to the numerical data involved and the analysis of the statements indicate that the situations evoked are mainly those that can be conveniently expressed according to the known numerical universe and the notions already studied in class. To do so, teachers made use of a series of problems common to the school tradition, introducing in them local traits and colors, with the purpose of lending them verisimilitude and familiarity.

On the one hand, they are not merely exercises copied from books. On the other hand, they don't arise from pupils' experiences and don't require solutions to be carried out. In the two sets of notebooks of the 1950s, arithmetic problems mimic real life but are formulated and resolved within the school.

The observations on the two sets of notebooks can't be extended to other classes and schools of the same time and region. But their fidelity to a portion of the official guidelines and their correspondence with the findings of Moreira (1955) suggest that they are not isolated examples of contradictory practices.

Are such contradictions intrinsic to official guidelines? Are they related to the training of the teachers? Is it the school effectiveness criteria which imposes this chasm between real life situations and math word problems in the 1950s?

The verification of such hypotheses requires further investigations, including the access to more representative collections of notebooks and the crossing with other types of sources. What can be concluded in any case from the two notebooks is the fecundity of these sources in the identification of singularities and traits common to classroom practices in a given place and time.

Whereas similar guidelines have been introduced in the curricula of other countries such as the United States and France, at the same time, it would be interesting, also, to examine representations of daily life activities and school culture featured in arithmetic word problems in these different contexts through dialogue among researchers.

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