CC BY NC ND

Cadernos de História da Educação, v.19, n.2, p.614-627, mai.-ago. 2020
ISSN: 1982-7806 (On Line)

https://doi.org/10.14393/che-v19n2-2020-20

ARTICLES

The supremacy of the writing over orality: an analysis of mathematical practices of subjects of a german colonization region[1]

A supremacia da escrita sobre a oralidade: uma análise de práticas matemáticas de sujeitos de região de colonização alemã

La supremacia de la escrita sobre la oralidad un análisis de prácticas matemáticas de sujetos de región de colonización alemana

Ketlin Kroetz
Pontifícia Universidade Católica do Rio Grande do Sul (Brasil)
http://lattes.cnpq.br/0390427253445059
https://orcid.org/0000-0001-8055-8124
ketlin.kroetz@acad.pucrs.br

Mônica da Silva Gallon
Pontifícia Universidade Católica do Rio Grande do Sul (Brasil)
http://lattes.cnpq.br/3410967379937204
http://orcid.org/0000-0003-0793-2372
monica.gallon@gmail.com

José Luis Schifino Ferraro
Pontifícia Universidade Católica do Rio Grande do Sul (Brasil)
http://lattes.cnpq.br/3175334112963316
https://orcid.org/0000-0003-4932-1051
jose.luis@pucrs.br

Abstract

This article discusses some written and oral mathematical practices of german settlers descendants from the German colonization region of the Vale do Rio dos Sinos, and aims to verify how they were used by these subjects both during the school period and in their agricultural work activities. The theoretical contributions used for this research are mainly based on studies of Weber (2002), that evidences that oral mathematical stand out in these individuals work activities, while in the school period it's observed a legitimization of a mathematics characterized by writing, which confirm a supremacy of the writing over orality throughout schooling. Therefore, the use of orality practices can become a possibility for a frequent (re) thinking of mathematical education, since writing prevails in different instances of the school context, producing subjectivities that empower such discourse, ensuring the status of the only possible mode of mathematize.

Keywords: Orality. Writing. Mathematics.

[1] English version by Ana Paula Pereira da Costa Debus. E-mail: anapaulapcdebus@gmail.com

Resumo

Este artigo problematiza algumas práticas matemáticas escritas e orais de colonos descendentes de alemães de região de colonização alemã do Vale do Rio dos Sinos, e objetiva verificar como as mesmas foram utilizadas por esses sujeitos tanto no período escolar, quanto em suas atividades laborais agrícolas. Os aportes teóricos utilizados para essa investigação estão fundamentados, principalmente, nos estudos de Weber (2002), evidenciando que práticas matemáticas orais se sobressaem nas atividades laborais desses sujeitos, enquanto que no período escolar se observa a legitimação de uma matemática caracterizada pela escrita, evidenciando uma supremacia da escrita sobre a oralidade ao longo da escolarização. Nesse sentido, a utilização de práticas que se valham da oralidade pode converter-se em possibilidade para um constante (re)pensar a educação matemática, uma vez que a escrita prepondera em diferentes instâncias do contexto escolar, produzindo subjetividades que empoderam tal discurso conferindo-lhe o *status* de único modo possível de matematizar.

Palavras-chave: Oralidade. Escrita. Matemática.

Resumen

Este artículo problematiza algunas prácticas escritas y orales de colonos descendientes de alemanes de la región de colonización alemana del Vale do Rio dos Sinos, y objetiva verificar como las mismas fueron utilizadas por esos sujetos tanto en el período escolar, como en sus actividades laborales agrícolas. Los aportes teóricos utilizados para esa investigación están fundamentados, principalmente, en los estudios de Weber (2002), evidenciando que prácticas matemáticas orales sobresalen en las actividades laborales de esos sujetos, mientras que en el período escolar se observa la legitimación de una matemática caracterizada por la escritura, evidenciando una supremacía de la escritura sobre la oralidad a lo largo de la escolarización. En este sentido, la utilización de prácticas que se valen de la oralidad puede convertirse en posibilidad para un constante (re) pensar la educación matemática, una vez que la escritura prepondera en diferentes instancias del contexto escolar, produciendo subjetividades que empoderan dicho discurso que le confiere el status de único modo posible de matematizar.

Palabras clave: Oralidad. Escrita. Matematica.

Received: 2019/11/14
Approved: 2020/01/15

Introducing the study

The studies on orality and writing that expanded significantly abroad, during the 1970s, ended up constituting a field of studies of an interdisciplinary nature in which themes related to the possible cognitive, sociocultural, linguistic and political effects of writing (BATISTA, 2000). From this, the numerous researches that have been carried out in the scope of writing indicate that its domain causes changes in the state of knowledge of a certain society or cultural group.

If we understand orality as a practice used by different cultural groups, it is easy to highlight the existence of tensions between oral and written practices, given that writing is usually legitimized and configured as hegemonic in modern society, while orality is often marginalized and seen as invalid (WEBER, 2002). Bunzen (2014, p.14), referring to written language, affirms that there is an imposed challenge to understand it not only as "[...] a linguistic (psycho) point of view, but it is also historical, anthropological and cultural one, taking into account power relations". The idea is putting the legitimacy of writing under suspicion, creating conditions of possibility for the different manifestations of language, among them, in its oral form.

In his doctoral thesis, Souza (2008) argues that writing produces truths and manufactures certain types of subject "[...] as people lacking a specific reasoning mode, typical of those who master writing technology" (SOUZA, 2008, p. 233). Thus, we have evidence that writing has great power in the constitution of the modern subject, since it is associated with both scientific progress and academic culture. In this way, orality is moved to the "magical world of voices" (CERTEAU, 1994, p. 224), giving an air of inferiority to speech. Given this fact, this article problematizes some written and oral mathematical practices of a group of colonists descended from Germans from a region of German colonization in the Vale do Rio dos Sinos[2], and aims to verify how such experiences were used and conceived by these subjects, both in the school period and in their work activities carried out in agriculture.

The empirical material consisted of statements taken from a master's thesis[3], produced through semi-structured interviews conducted with three settlers with low schooling[4]. The school period of the three subjects interviewed by Kroetz (2015) occurred between the 1920s and 1930s, concomitantly with the time when agricultural activities represented the families' only means of subsistence. Furthermore, this period was characterized by a peculiar political movement, the Nationalization Campaign, a set of measures adopted by the Getulist government during the Estado Novo, whose main objective was to reduce the influence of

[2] The city of Santa Maria do Herval belonged to São Leopoldo at the time of the arrival of the first German immigrants in Rio Grande do Sul, in 1824. One of the traditions inherited by immigrants was the language, Hunsruckish, which although it is being lost with the passing of the years, it is still considered, mainly among older subjects, as the main dialect used for communication.

[3] The narratives were taken from the dissertation Ethno-mathematics and power relations: an analysis of narratives of settlers descending from Germans in the Vale do Rio dos Sinos (KROETZ, 2015). The interviews that produced the narratives were conducted in Hunsrückisch and transcribed by the researcher into Portuguese after undergoing an audit. The Hunsrückisch Project emerged in Santa Maria do Herval in 2003 for preserving and creating a writing code for the language and preserving the language of Herval's children and families. Coordinated by Professor Dr. Úrsula Wiesemann, from Germany, and with the help of collaborators from Santa Maria do Herval, the project was developed at the Municipal Museum of the city and in 2008, received the HRX, making the registration as a language in the Ethnologue, organ that catalogs all the languages on the planet. Currently, Hunsrückisch is partially recognized as the city's second official language, and has been taught in some schools in the municipality since 2009. Hunsrückisch is spoken in southwestern Germany and has become a *lingua franca* among German descendants in cities of German colonization, expanding with the arrival of the first immigrants in the south of the country and persisting until the 21st century (KROETZ, 2015).

[4] As the author adopts an ethno-mathematics perspective, one of the criteria for choosing the interviewed subjects was low schooling, supported by the conception of Ascher and Ascher (1986). In addition, living in the countryside, having worked in agriculture and being indicated to be part of the study by informants, were also some criteria adopted.

foreign immigrant communities in Brazil, forcing their integration with the Brazilian population (SEYFERTH, 1990).

Since the subjects' narratives are directed to a period of the past, oral history was adopted as a research methodology; since it is possible to concatenate aspects of the historical scenarios linked to past school practices and understands the reflexes nowadays (GARNICA, 2004).

About the Oral History

Oral History (OH) is traditionally used in the field of History and Social Sciences, and aims, according to Silva and Souza (2007), the valorization of oral narratives as study material. In this perspective, the use of OH began to be considered as historians understood that historical documents were susceptible to adulteration (GAERTNER; BARALDI, 2008). However, it is worth noting that using this approach is not about admitting the existence of *a true story*. In view of this, Garnica (2005) emphasizes important elements brought by orality, such as dynamism, record corrections and the chance of transforming *objects of study* into *subjects*, which by other instruments of data collection might not be accessible. According to Silva and Souza (2007, p. 142):

> Oral narratives are seen by oral history as sources from which it becomes possible to get closer to the meanings attributed to the realities experienced by the narrator, since it seeks (in most cases) to preserve, in an almost literal presentation of the narratives collected through interviews, the legitimacy of the narrator.

The procedures required by OH include:

> The pre-selection of deponents, probing of possible documents that deal with the topic of the interviews to be recorded, recorded interviews that will constitute the base document of the research, instances of transforming the oral document into writing: literal transcription, textualization and transcreation [...]; 'Legitimation' [...] and, finally, a moment of analysis, whose character varies according to the purposes of each research (GARNICA, 2007, THOMPSON, 1998 apud SILVA, SOUZA, 2007, p. 144).

According to Gaertner and Baraldi (2008), the reports obtained through interviews constitute individual trajectories and must be understood as such. Also, the researcher is required to have ethical principles in relation to the interviewees that must be respected, since memories can be revived marked by emotions and facts that were hidden. Still, another important aspect is that OH is conditioned to the interviewee's memory, and this is selective, being able to create multiple versions of past events (GAERTNER; BARALDI, 2008). It is also noteworthy that, in addition to the materials obtained through the interviews, the researcher can use other research sources.

In this study, oral sources are used, based on interviews provided by three subjects, settlers, residents of the city of Santa Maria do Herval, Rio Grande do Sul. The statements

analyzed here are an excerpt from the work of Kroetz (2015), followed by the methodological procedures suggested for Oral History, seeking contributions regarding the understanding and negotiation of mathematical meanings for this cultural group (GARNICA, 2005).

About the oral and written practices

> *R[5]: And what did you do to control what you earned?*
> *IC: The control was all with me, but I didn't need to write anything, I knew everything in my head.*
>
> *R: Didn't you need to write anything down on paper? IC: Nothing, I remembered things.*
> *IB: We used to do the math more in our heads, for selling, for buying; we knew that, the father taught all of this.*
>
> *R: And how did you know it was worth the same [exchanges]? IB: Ahh, that was in the "eye", right? In the "head". IA: Yes, then if it is decreasing and I need more, I borrow one, we learned this at school. But I always had my bills ready in my head before going on sale (market)*
> *IA: We were very quiet at school, one sitting behind the other, straight, almost without moving, I could only look at the board and write.*
> *IB: The teachers wrote on the board and that's all, I had to copy it. The children studied, if we could continue to study. First we learned einmaleins, 1 x 2, you know? Then ABC. First the father taught this and he said: how do you want to learn the rest if you don't know this?*

The excerpts above were taken from Kroetz's dissertation (2015). In her studies, where the author aims to identify and understand the processes of generation, organization and dissemination of the knowledge of colonists who descend from Germans living in the Vale do Rio dos Sinos region, she verifies that the generation of the knowledge of this group occurred with their parents and acquaintances, and that the language games[6] used in agriculture were different from those imposed by the school. One of the differences pointed out is that if writing used to predominate at school, for example, in the subjects' experience, orality prevailed.

[5] The letter R corresponds to the researcher; IA, interviewee A; IB, interviewee B and, IC, interviewee C.

[6] Wittgenstein's concept (2004). For the author, the different rules used in the language make up a game. These rules, emerging in a form and life, make Wittgenstein (2004) highlights that the real meaning of words is found in the use that is made of them, in a language game established between subjects. Thus, language is given a particular character, and it begins to present meaning through its use. When speaking a language the subject is exercising an activity, a certain way of life, hence the connection between language and the way of life, as this is immersed in a situation in the world. When the author refers to language as part of a way of life, he points out that language involves more than just speech. In this sense, when mentioning the expression language games, Wittgenstein (2004) refers to the multiplicity of uses of language, which are aspects of the subjects' way of life. Thus, as mathematics is a language, there would be several mathematics, in the plural, which make sense, according to the use made of them.

While in the colonists' work activities, they affirm that they do not need to write anything down, know everything in their *heads*, it is easy to see that orality was a practical way of solving their daily situations. However, in the school period, the same subjects emphasize that mathematics was only considered on *paper*. When pointing out the rigidity of the teachers, who used disciplinary mechanisms to shape the students, the colonists affirm that the contents were written on the board and that it was necessary *to set up the calculation* and put the figures under each other in mathematics classes[7], which can be seen in the following passage: IA: *We suppose to add like this [the calculation], one under the other, you know? ... Adding and subtraction, as I learned at school.* R: *Were the calculations always under each other?* IA: *Yes, then if I were subtracting and I needed to "borrow" one, we learned this at school.*

It is clear, then, that the school was responsible for the control and use of time with techniques that branched out into a hierarchy of knowledge, organizing internships through graduated tests, which based on the writings of Foucault (1987, p. 135), "[...] they include exercises of increasing difficulty; qualifying individuals according to the way they go through these series". One of the procedures of this technique is the exercise, understood by Foucault (1987) as a technique that imposes several repetitive and intensified activities that obey a hierarchy, it was marked by writing.

One of the materials used by the colonists to do school exercises in the past was *tafel* and *griffel*. According to the colonists interviewed, the tasks were reproduced on slates made of smooth slate stones. They wrote on its surface with a pointed object made of stone, which they called the *griffel*. They used a piece of cloth as an eraser, but in most cases, they rubbed it with their own hands. For Souza (2007, p. 83), the slate and the blackboard "[...] served as instruments for the schooled child to learn the first movements of correct writing." The subjects stand out: "*We used a tafel, a little board, and we wrote with a nail*" and "*We had tafel*[8] *and a griffel*[9]*. If it fell on the ground it would break. We dipped a pen in an ink, I could only dip a little, if I put it too much it would still smudge.* " The tafel consisted of a stone or wooden surface used as a support for writing, it used to be efficient in assisting the teacher in his teaching and making students copy what was necessary.

According to the narratives of the interviewed subjects, the exercises were copied from the board using a *tafel* and a *griffel* (figure 1), two artifacts with a significant symbology regarding the school period of these subjects.

[7] Mathematics, written in capital letters, concerns, in this study, the knowledge transmitted to subjects at school, which can be called school mathematics. Bernstein (1996), when analyzing the pedagogical discourse of physics taught at school, points out that this is the "[...] result of re-contextualizing principles that made a selection and displaced what counts from the primary context of the production of the 'discourse' as Physics and replaced it, refocused it, in the secondary context of discourse reproduction "(BERNSTEIN, 1996, p. 260-261). Like physics, school mathematics is a re-contextualization of academic mathematics and its legitimacy.

[8] Translation: Panel. Slate, in the singular, or "slate board" - used to translate the noun tafel from German, also called "stone" and "plank board", in Portuguese; words cited in the Great Brazilian Encyclopedia (19 [-?], p. 160).

[9]The word "pointer" was used in the dictionary when the word "slate" was introduced with the explanation that it is written or drawn with "pointers of the same stone" (FERREIRA, 1999, p. 1049). For the German, its correspondent would be *Griffel*.

Figure 1: *Tafel* and *Griffel*

Source: It was extracted from Kroetz (2015).

The *griffel* can be considered as an artifact used to write on the *taffel* what the teacher wrote on the board, as evidenced by interviewee A: "*We were very quiet at school, we used to sit one behind the other, in lines, almost without moving, I could only look at the board and copy it*". It is noticed the existence of a superiority attributed to the written language in the school period of these subjects, different from the practices carried out in agriculture, where orality prevailed. This valorization of writing over orality, if we take Foucault's writings (1987, p. 157) in *supervising* and *punishment*, places the subjects in a kind of "[…] network of written notes [that involve] documents that they capture and fix them". For Souza (2008), it is this written practice that strengthens and prioritizes the repetition and training of exercises, as well as the use of different forms of disposition on paper. Such practices would be considered as essential so that the subjects could develop their mathematical thinking.

There is still the impression that teachers, in the school period of these subjects, generalized the way of thinking emphasizing a hierarchy - naturalized by modern teaching - to the ways of teaching, which is noticeable when the colonists say that "*First we learned einmaleins*[10]*, 1 x 2, do you know? Then, ABC. First the father taught this and said: how do you want to learn the rest if you don't know this? Let's say, 8 x 4 what is the result, 32, then we wrote it on the tafel. If you didn't know that, how can you go on?* " (Interviewee B).

The interviewees' speeches confirm a certain rationality regarding the learning of Mathematics. Fernanda Wanderer (2007), when analyzing the speeches about school and school mathematics of a group of colonists of German descent who attended a rural school in the municipality of Estrela, during the period of the Nationalization Campaign, highlights, in this matter, it was "[...] constituted by rules that say the importance of decorating the multiplication table" (WANDERER, 2007, p. 173). The multiplication tables and armed accounts characterized the teaching of mathematics during the school period of the subjects, of a mathematics that had no meaning in the social scene in which the subjects were inserted, agriculture.

Emmanuel Lizcano (2004) is going to propose a change in the way we refer to Mathematics, pointing out that we have the custom of "[...] giving it as a suggestion (that is, placing it under us, as fixed ground) and since then, look at popular practices, in particular, at popular ways of counting, measuring calculating [...] "(LIZCANO, 2004, p. 125). From this school mathematics - this recontextualization of academic mathematics -, we tend to analyze local practices, always using more advanced mathematics as a reference. Based on this, Lizcano (2004, p. 125) points out that the others' mathematical practices are delegitimized because they are less like the mathematics we learn at school: "But what happens if we invert our eyes? What

[10] Translation of multiplication table

do we see if instead of looking at popular practices from "mathematics", we look at mathematics from popular practices? "

Unlike mathematics taught at school, where it was necessary to present calculus in written form, oral mathematics practiced by the colonists interviewed was permeated by language games marked by estimation, proportional thinking and orality. This can be seen below:

> *IC: That's right. Then, when I got older, we got fertilizer from Banco do Brasil, and they gave us a 40% discount. R: And is it a good discount? IC: Ahh, it is. It's almost half off. R: And what would you do to know that? IC: Look, 100 out of 40, right? So it is percent I think. R: Could you give me an example? IC: Let's suppose, you bought it for R$ 1,000.00, you will earn R $ 400.00. That's a good discount. Imagine ... it is almost a half of the value.*
> *IA: More or less, for each 20kg of lard we used about 4kg of soda. R: And if I only had 2.5 kg of soda, how much lard would I need? IA: About 12kg and 500 grams. R: How do you know that? IA: If I need 4 kg of soda for 20 kg of lard, then for 1 kg of soda I need 5 kg of lard, right? R: Yes. IA: So if it is for 1 kg of soda I need 5 kg of lard, for 2 kg of soda I need 10 kg of lard. And I'll do the rest later. R: What rest? IA: The decimal numbers. If for 1kg of soda I need 5kg of lard, for half a kilo I need 2.5kg of lard, right? So it plus 10 is 12.5kg.*

However, even though these colonists used oral mathematical practices to deal with business and various activities in the past, the writing used at school was a mechanism exercised by those who dominated it: teachers. This is also noticeable when the colonists affirm that nowadays business is done on paper, but in the past they could do business by word of mouth.

The narratives elucidate a certain tension between these subjects' oral and written mathematical practices, as in the school period of the colonists, the practices adopted were focused on writing, and in agriculture the colonists used techniques based on orality. When subjects opt for orality for possible business and agricultural activities, they have no need for written mathematics, and do not need to set up the account and place one under the other, as they do at school. In addition to mathematical knowledge, it is perceived other knowledge implicit in these people's actions, knowledge probably not stimulated at school, since the formal education provided to them was based on the learning of mathematics, literacy through Portuguese and the teaching of religion.

The 21st century school is not much different from the schools attended by the colonists interviewed. Oral practices in mathematics classes tend not to be considered, and if the student does not present a specific or "appropriate" type of reasoning from the teacher's point of view, he/she often becomes the target of corrective pedagogical interventions. The school does not meet the expectations of the students, since for some cultural groups, this school mathematics, coming from academic mathematics, does not make sense. The colonists did not need the paper and the pen to solve various situations that occurred in their ways of life, and in this sense it is worth mentioning that oral mathematical practices are distinguished from writing not only by dispensing with the registration of writing, "[...] but also because they are parameterized by other values and intentions (such as pragmatism in the option for the agile production of an approximate response at the expense of the meticulous search for precision) "(SOUZA, 2008, p. 251).

The tensions between orality and writing, based on an ethnomathematical approach, are the target of studies by Gelsa Knijnik (2007). The author points out that, at school, written mathematical practices have more value than oral practices, a study carried out by the author in a settlement of

the Movimento Sem Terra, MST, in Rio Grande do Sul. In her studies, Knijnik (2007, p. 36) denounces the "[...] disappearance of oral mathematics as a cultural practice in educational processes." In the same direction, Souza (2008, p. 234) points out that the truths constructed about written mathematics produce certain types of subjects, "[...] those who dominate writing technology and are therefore allowed to 'practice 'school mathematics and those who still need to master this technology to be inserted in school mathematical practices."

Thus, the domain of writing appears as a device of power, as it determines access to a type of knowledge. In Microphysics of Power (2014), Foucault describes the devices as material operators of power, as a heterogeneous set that encompasses statements, laws, institutions and discourses, where the device is the network that forms between these elements (FOUCAULT, 2014). Among these elements, there is a set of games that allows the formation of a new field of rationality, that is, it is from them that the asymmetries of relationships become visible. Thus, the relationship between knowledge and truth is also evident, as mastering writing implies a power that affects the maintenance of a regime of truth - in this case, the mastery of writing to learn official, true Mathematics. This mathematics would reinforce the effects of this power, making us believe that without knowing how to write it would not be possible to know.

In this scenario the French anthropologist Florence Weber's studies (2002) on the diversity of the natives' reasoning and the economic practices of families in her country can be referenced, where the author states that such reasoning is not always explicit, because the natives have a plurality of reference systems, rules and objectives, using different rationales that only make sense in what the author will call the social scene. Weber (2002) highlights that it is this plurality of measurement and calculation systems adapted to different uses that leads to the conclusion, after articulating several studies carried out in different social scenes, that the units of measurement adopted depend on the context of the practice, and that it is the interaction that gives meaning to the transaction that always occurs in a given scenario.

Regarding purchases and the different businesses established in agriculture, the colonists affirm that nowadays, if nothing is on paper, nothing else is worth it, and that in the past business was done by word, that is, nothing was signed, only agreed. We are so used to the legal and institutional transaction system that we end up forgetting all the other ways of doing business. Weber (2002, p, 162-163) points out that this fact is strange for us, because "[...] far from the legal guarantees offered by contracts and commercial law, which are accompanied by written evidence and signatures, they take us to the universe in which the word given and belonging to the group are sufficient." The guarantee and the trust that the colonists place in each other makes the orality also marked by values that they consider essential in their community, such as the credibility and trust established among the members of their group.

Thus, the group of colonists interviewed, when constituted as belonging to a certain social scenario where agriculture, manual labor, exchange of products and the exchange of work predominates with the neighbors, systems of measurement and oral calculation that are directly involved in its use. A clear example of this is the unit of measurement called *quarter*[11] by the settlers, a unit taught by their parents, neighbors and people in the community. When asked about what would become a *quarter*, the settlers stated:

> *EA: A quarter is about 7.5 kg. Eight quarters is a sack. We measured with quarters in the past, few people used kilos. R: What was it like? IA: We didn't use a scale, right? That's why we used quarters and made these exchanges. We used to take a piece of meat in our hands and said how much it was approximately.*

[11] It was a gallon of kerosene that, after being used, served as a unit of measurement so that the colonists had a base of the amount of grains of corn, beans or even potatoes that would fit in a sack or how many quarters would be planted.

> *IB: Two quarters is a whole gallon, half a gallon full of seeds equals one quarter. Four full gallons gives about 60kg, it depends on what gives a full potato bag. R: And with corn, and other seeds, was it the same thing? IB: yes, the same thing*
> *R: So, was it your measure?*
> *IC: Yes, and if we did it right, we didn't even need to weigh it because it was the same thing. The scales [...] we started to use them later. R: And did this measure work for everything? IC: Yes, but I had to put it right too, ok? They were gallons of kerosene because we didn't have electricity, right? Then we kept these cans to put beans, potatoes, and for measure. Everyone did it in the old days, so we did it too. Four whole gallons were a full bag.*

This metric system presented by the colonists uses specific practices for weighing and quantity of grains to be planted. On the different reasoning of the natives, Weber (2002, p. 160) highlights that

> [...] in the universe where the clock, scale and register are ubiquitous, their use is not imposed uniformly in all domains of practice or [...] in all universes of social relations, in all ' social scenes'. In addition, the use of measurement techniques is sometimes accompanied by conflicts over the legitimacy of the measure or the relevance of the tools. Forgetting it is giving in to an angelic vision of social relations and of relations between science and society.

A unidade de medida adotada pelos colonos, além de fazer parte de uma cena social que só faz sentido no modo de vida dos colonos, é caracterizada por regras do mundo da agricultura, e não possui significado em outras cenas sociais. Weber (2002, p. 160) vai provocar, pontuando: "de que vale uma medida 'científica' para explicar comportamentos se ela não é utilizada, ou seja, percebida, pelas pessoas concernidas?" Na vida dos sujeitos, nas transações comerciais, na agricultura e em todas as estratégias adotadas, as necessidades de matematizar eram outras, e iam muito além do que a escola insistia em lhes cobrar, muitas vezes, de modo rígido e valendo-se de técnicas disciplinares como a vigilância e a punição (FOUCAULT, 1987). Além disso, as práticas orais superam a funcionalidade de registros escritos, onde certamente não fazia sentido recorrer à ciência, ao cálculo exato e formal, uma vez que ele não se apresentava produtivo em suas vivências.

The unit of measure adopted by the colonists, in addition to being part of a social scene that only makes sense in the colonists' way of life, is characterized by rules from the world of agriculture, and has no meaning in other social scenes. Weber (2002, p. 160) points out: "what is the use of a 'scientific' measure to explain behaviors if it is not used, that is, perceived by the people concerned?" In the subjects' lives, in commercial transactions, in agriculture and in all the strategies adopted, the needs to mathematize were different, and went far beyond what the school insisted on charging them, often, in a rigid way and using disciplinary techniques such as surveillance and punishment (FOUCAULT, 1987). In addition, oral practices surpass the functionality of written records, where it certainly did not make sense to resort to science, to the exact and formal calculation, since he was not productive in his experiences.

In addition to orality and writing, Weber (2002, p. 168) presents the concept of economic calculation, conceiving it as a way of life, since "[...] practical rationalities are not always offered to observation under the form of explicit reasoning, lists of notes or measured

activities, but they can remain automatic or unconscious ". Many of these ways of mathematizing are unconscious, made by rules, and operate through behaviors and strategies. Some reasoning is even automatic and, given that, it makes no sense to resort to numerical calculation if there is an effective way of economic calculation to minimize expenses and forecast your budgets, for example.

When showing different ways of mathematizing, such as organizations, techniques and predictions of the natives, Weber (2002) highlights the need to forget about calculus only as something formal, in its abstract conception, as there are specific categories of classification and incorporation that make sense in some social scenes. Weber's writings (2002) contribute to the problems that have been carried out in relation to the supremacy of writing, helping to understand that there are other ways to mathematize and that these depend on a context, on a social scene that only makes sense to those who are inserted in it. Some cultural groups, for example, do not use writing, counting or numerical calculation, but use techniques of ordering and classifying categories that allow the inference of certain expenses. However, such techniques and practices are not legitimized because they do not use the rules of academic mathematics and are often not even seen as mathematics.

One of the ordinary forms of calculation found by Weber (2002) in a study with horticulturists in France is orality, used to pass the budgets whose calculations were performed in the head. Such oral calculation strategies, for Knijnik (2004, p. 233), are "[...] interdicted at school in the name of written algorithms". Orality represents a cognitive operation adapted to the practical needs of this subject, where the techniques of measurement and calculation owe nothing to the formal system (WEBER, 2002). Thus, the abstract conception of calculus is abandoned and the native categories of classification and incorporation are verified. Souza (2008, p. 235) also affirms that in the school environment "[...] the use of writing also functions as a mechanism to legitimize school mathematical practices, when imposing itself in this space, many times, as the only way, and always the most correct way, of doing mathematics ".

The low valuation of mental calculation and orality is still a matter of study, as evidenced by Boni, Savioli and Passos (2015), when they demonstrate that one of the issues that lead to this is the teacher's own deficiencies in their initial training, emphasizing the importance of mental calculation because it is a more functional way to be used in everyday life. However, as seen in the school period of the colonists, an official assessment or verification by the teacher of the student's proficiency through orality becomes more complex (BONI, SAVIOLI, PASSOS, 2015). This ends up producing tensions between these two mathematical practices, "[...] a mathematics that is produced in the urgencies of life, in which orality is triggered with greater frequency, efficiency and legitimacy, and another, written, which meets demands in which generality, formality and control are valued "(SOUZA, 2008, p. 235-236). Such situations can be evidenced when the colonists emphasize that to make lard, to take care of the business of selling potatoes and for planting, for example, they need to mathematize in another way, as such situations go beyond the teachings seen in the classroom, which they are usually guided by written mathematics that is sometimes out of context with real situations.

Final Thoughts

This study, by presenting some written and oral mathematical practices by a group of colonists descended from Germans from a region of German colonization in the Vale do Rio dos Sinos, found that oral mathematical practices stand out in agriculture and in the practical activities of the interviewed colonists, while mathematics characterized by writing is legitimized at school. There is supremacy of writing over orality, which can be easily verified in the daily life of schools from prescriptions of program-curricula.

If we analyze current mathematical education, it is easy to see that oral practices have no place in the school environment. Knijnik (2007, p. 37) denounces the disappearance of oral practices at school, as this disappearance produces "[...] social effects that go beyond school failure". Accordingly, the author still complements that

> [...] oral mathematics, specifically that linked to processes involving operations of addition, subtraction, multiplication and division, assumes a more prominent role, precisely because such oral practices integrate, even nowadays, the repertoire of knowledge that a significant number young people and adults have (KNIJNIK, 2007, p.37).

The tensions between the oral and the written produce a discourse that the written has a greater value than what is said. Such discourse, according to Souza (2008), is put into circulation by many subjects of the field of education, such as students, parents, teachers, public policies, managers and the community in general. The constant use of writing in the school life of the colonists interviewed makes it seen as the only way to teach, and the oral model of thought is used by the subjects in agriculture as they use, for each occasion, strategies that differ from the rules imposed by the school.

Unlike the school period, where mathematics is presented as a formal and rigorous discipline, marked only by written practices and armed accounts, when using certain knowledge in their contexts using orality, mathematics can be viewed in another way, not as a hard science, but as something that transcends the exact calculations and can be found in the ways of knowing and doing in different cultures, permeating different knowledge used for certain purposes, not establishing disciplinary limits, but worrying about solving the group's daily problems of settlers.

Using practices of orality can constitute one of the directions of mathematical education, since written practices are still strongly consolidated in school contexts, producing subjectivities that legitimize such a way of mathematizing (SOUZA, 2008).

References

ASCHER, M.; ASCHER, R. Ethnomathematics. **History of Science,** n. 24, june. 1986, p. 125-144. https://doi.org/10.1177/007327538602400202

BATISTA, A. A. G. Letramentos escolares, letramentos no Brasil. **Educação em Revista,** Belo Horizonte, v. 1, n. 31, p.171-190, jun./2000.

BERNSTEIN, B. **A estruturação do discurso pedagógico:** classe, códigos e controle. Petrópolis: Vozes, 1996.

BONI, K. T.; SAVIOLI, A. M. P D.; PASSOS, M. M. Compreensões e dificuldades de professoras a respeito do cálculo mental. **Acta Scientiae**, Canoas, v. 17, n. 3, p. 563-577, set./dez. 2015.

BUNZEN, C. Apresentação. In: STREET, B. **Letramentos sociais**: abordagens críticas do letramento no desenvolvimento, na etnografia e na educação. São Paulo: Parábola Editorial, 2014. p. 7-11.

CERTEAU, M. **A invenção do cotidiano 1:** artes de fazer. Petrópolis: Vozes, 1994.

FERREIRA, A. B. de H. **Novo Aurélio Século XXI:** o dicionário da língua portuguesa. 3. ed. Rio de Janeiro: Nova Fronteira, 1999.

FOUCAULT, M. **Vigiar e punir:** nascimento da prisão. 5. ed. Rio de Janeiro: Vozes, 1987.

FOUCAULT, M. **Microfísica do poder.** 26. ed. São Paulo: Graal, 2014.

GAERTNER, R.; BARALDI, I. M. Um Ensaio Sobre História Oral e Educação Matemática: pontuando princípios e procedimentos. **Bolema**, Rio Claro, v. 21, n. 30, p. 47-61, 2008.

GARNICA, A. V. M. História oral e educação matemática. In: BORBA, M. C.; ARAÚJO, J. L. (Org.) **Pesquisa qualitativa em educação matemática**. Belo Horizonte: Autêntica, 2004. p. XX.

GARNICA, A. V. M. A História Oral como recurso para a pesquisa em Educação Matemática: um estudo do caso brasileiro. In: Comunicação apresentada no V Congresso Ibero Americano de Educação Matemática, Porto, 2005. Disponível em: www.jurandirsantos.com.br. Acesso em: 14 maio 2017.

KNIJNIK, G. Mathematics education and the Brazilian Landless Movement: three diferente mathematics in the context of the struggle for social justice. **Philosophy of Mathematics Education Journal**, v. 21, p. 1-18, 2007.

KNIJNIK, G. Itinerários da Etnomatemática: questões e desafios sobre o cultural, o social e o político na educação matemática. In: KNIJNIK, G.; WANDERER, F., OLIVEIRA, J. C. **Etnomatemática, currículo e formação de professores.** Santa Cruz do Sul: EDUNISC, 2004, p. 19-37

KROETZ, K. **Etnomatemática e relações de poder:** uma análise das narrativas de colonos descendentes de alemães da região do Vale do Rio dos Sinos. 2015. Dissertação (Mestrado em Educação em Ciências e Matemática) – Programa de Pós-Graduação em Educação em Ciências e Matemática, Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, 2015.

LIZCANO, E. As matemáticas da tribo européia: um estudo de caso. In: KNIJNIK, G.; WANDERER, F.; OLIVEIRA, C. J. de (Org.). **Etnomatemática, currículo e formação de professores**. Santa Cruz do Sul: EDUNISC, 2004, p. 124-138.

SEYFERTH, G. **Imigração e Cultura no Brasil**. Brasília: Universidade de Brasília, 1990.

SILVA, H; SOUZA, L. A. A História Oral na Pesquisa em Educação Matemática. **Bolema**, Rio Claro, v. 20, n. 28, p. 139-162, 2007.

SOUZA, M. C. R. F. **Gênero e Matemática(s):** jogos de verdade nas práticas de numeramento de alunas e alunos da educação de pessoas jovens e adultas. 2008. Tese (Doutorado em Educação) - Programa de Pós-Graduação em Educação: conhecimento e inclusão social, Universidade Federal de Minas Gerais, Belo Horizonte, 2008

SOUZA, R. M. S. A cultura material escolar da Deutsche Schule. **Revista Brasileira de História da Educação.** v.7, n.2, p.69-94, maio/ago. 2007. Disponível em: http://rbhe.sbhe.org.br/index.php/rbhe/article/download/130/140. Acesso em: 7 dez. 2015.

WANDERER, F. **Escola e Matemática Escolar:** mecanismos de regulação sobre sujeitos escolares de uma localidade rural de colonização alemã do Rio Grande do Sul. 2007. Tese (Doutorado em Educação) - Programa de Pós-Graduação em Educação, Universidade do Vale do Rio dos Sinos, São Leopoldo, 2007

WEBER, F. Práticas econômicas e formas ordinárias de cálculo. **Mana,** Rio de Janeiro, v.8, n.2, out/ 2002, p.151-182. https://doi.org/10.1590/S0104-93132002000200006

WITTGENSTEIN, L. **Investigações filosóficas.** São Paulo: Nova Cultural, 2004.