



Radioaulas do Projeto Minerva: produção de leituras

Radio classes in the Minerva Project: production of readings

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Resumo

Neste texto abordamos possíveis leituras produzidas a partir dos materiais que compunham as radioaulas do Projeto Minerva e seus documentos de base (Material Bruto, Texto Bruto, Fascículo, Script e Áudio). Estas leituras tiveram origem no processo de doutoramento e permanecem ativas, em movimento. Naquela ocasião flertávamos com a Hermenêutica de Profundidade como possibilidade de guiar nosso olhar neste caminho, por aproximação com outros trabalhos desenvolvidos no Grupo de Pesquisa (GHOEM), e com a Filosofia de Linguagem de Wittgenstein, por já termos trabalhado com ela durante o mestrado e por esta se alinhar com nossos posicionamentos epistemológicos. Trazemos, mesmo que de forma pontual, alguns elementos desta discussão entre possíveis referenciais teóricos e suas implicações para a pesquisa e para os modos de se proceder análises (leituras) de impressos para o ensino.

Palavras-chave: Projeto Minerva; Ludwig Wittgenstein; Radioaula.

Abstract

In this text, we discuss possible readings produced from the materials that made up radio classes in the Minerva Project and its basic documents (Raw Material, Raw Text, Fascicle, Script and Audio). These readings originated in the doctoral process and remain active, on the move. At that time, we flirted with the Hermeneutics of Depth as a possibility to guide our gaze on this path, by approaching with other works developed in the Research Group (GHOEM), and with Wittgenstein's Philosophy of Language, because we had already worked with it during the master's and for this to align with our epistemological positions. We bring some elements of this discussion between possible theoretical references and their implications for research and for the ways of carrying out analyzes (readings) of printed material for teaching, even in a specific way.

Keywords: Minerva Project; Ludwig Wittgenstein; radio classes.

Beginning: conceptions of history and methodological choices for analysis of didactic material

In putting it into a historiographical practice, we argue, it is important to question our conceptions of past, history, historiography, and the ways in which the past is "accessible" to us (or amenable to production - as we prefer). In reading materials dedicated to teaching or the teacher, as is the case in this thematic dossier, we also have questions about ways of reading these texts focusing on the production of scientific knowledge.

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In this article we will seek to discuss these issues, initially triggered by the Minerva Project's material analysis intent. Between 2010 and 2013 we have been focusing on this project, under the most varied sources and ways of thinking about it.

In a very synthetic way, the Minerva Project (PMi) was an action of the Brazilian Military Dictator that aimed to provide possibilities for the conclusion of the First and later of the Second Degree, with several modes of participation of the Project, but always having the radio diffusion as main element of this training. Two classes of the Minerva Project were broadcast daily, along with Hora do Brasil, via radio, one of each subject. These radio classes could be accompanied by Fascicles, directly collected on the radioposto² to those formally enrolled, or purchased in newsstands, by those not enrolled, but who would like to request the tests at specific times or who only wish to broaden their knowledge. Our deponents bring us that the PMi was a response of the Military Dictatorship to other initiatives of a social nature, such as the Basic Education Movement (MEB) of the Catholic Church, the Natal Radio Schools and the Paulo Freire Method, all of these according to the Dictatorship Military, loaded with ideologies and, therefore, should be extinguished, and for that, it was necessary to put something in the place.

Since 1937, the Educational Broadcasting Service (SRE) already existed in the Federal scope, and in the 1970s it was the organ responsible for administrating and managing the Minerva Project. The base of operation of the PMi was Radio MEC³, located in Rio de Janeiro, also linked to the SRE, it was the official Brazilian radio, equipped with its own building and sufficient infrastructure to house such an action. However, for this project, people outside the Radio, especially teachers, were hired for the initial preparation of the classes. These had little or no contact with the Radio, some were from other cities and states and work from their homes by correspondence.

Radio MEC could not be tuned to all locations in Brazil. Infrastructure adjustments were made so that a chain network could be set up with all the radio stations in the country so that the Project and the Hora do Brasil (The Brazil Hour) could be transmitted - by law, moreover. According to Marlene Montezi Blois (interview in Pinto, 2013), there was a second intention in this chain, to monitor all the radio signals in the country, and could even block waves that came from "the enemies" of the State at this time.

With the network set up, Marlene and Solange Leobons were in charge of organizing the rest of the PMi structure: hire teachers to prepare the material, think about the functioning of the classes, monitors, radio station, distribution of printed material, finally, an infinity of

² "Radioposto" is the name given to the place where students and monitors meet, on average two hours a day, from Monday to Friday, to read the fascicles, do the work and listen to the programs on the radio. The "Radioposto" could be installed in very diverse places, like schools, churches, barracks, sheds etc.

³ Radio MEC of Rio de Janeiro is the heir of the first radio station in Brazil, Rádio Sociedade do Rio de Janeiro, created in the early 1920s by a group led by Edgard Roquette-Pinto. After a few years, under the risk of bankruptcy, the radio was passed to the Federal Government (MEC). Thus was born the Radio Ministry of Education.

details specific to this modality of teaching, of a project of national scope. The activities were initiated with the Supplementary Course of First Degree, being all the steps accomplished by this team coordinated by them. When the need arose to offer the Second Degree, the Government opted to establish a partnership with the Roberto Marinho Foundation and take advantage of its written material, aimed at accompanying the classes on television.

We came in contact with several materials produced in the Minerva Project: Gross Text, Raw Material, Script, Class Audio and Fascicles, both First and Second Degree. In one of the movements of the doctoral thesis, we chose to look at a class in all its stages. Even with the great collection of SOARMEC⁴, we had great difficulty in finding all the materials of the same class, especially the audios, since it is a collection basically of written documents. This paper composed the volume entitled "From Mathematics Spoken, from the Rescue of Sources, from the Potentiality to Understand from Multiple Foci: An Essay on Radio classes Production in the "Minerva Project" (Pinto, 2013).

Initially, we had only the theme " Minerva Project ", we knew that very little had been produced on its courses (that originated the quite widespread "Telecursos") and that had had national scope and lasted more than a decade. We did not know, however, which references would help us to read such documents, that is, what would be the theoretical-methodological references that would guide us in this endeavor. Located in Mathematics Education, we had an interest in understanding the Project as a whole, but also, producing knowledge about ways to teach mathematics through the radio.

In the Group Oral History and Mathematics Education (GHOEM), in 2011, when we started the research, there were works that were dedicated to the analysis of ancient books, especially textbooks.

From 2005 the GHOEM has been constituting a collection of books related to Mathematics Education. They are old mathematical textbooks that currently total almost one thousand five hundred works published in Brazil and abroad and that date from century XVII until the decade of 1970. Also, they compose this collection works of the areas of Education and Sociology, in addition to didactic books of other disciplines (mainly works related to the teaching of first letters). This material represents, for us researchers in Mathematics Education, one of the many possibilities to write stories of Mathematics Education. (Andrade, 2012, p.12)

The work of Oliveira (2008), however, inaugurates a propositional movement regarding methodological references focused on the analysis of ancient books (especially books aimed at teaching). He points out that groups working with old math books in Brazil have their own methods of working. The GHOEM attempted to initiate a systematic movement of research in this direction and sought, through Oliveira's work, to understand how this was being done at the national level. The author then proposes Depth Hermeneutics

⁴ Society of Friends Listeners of Radio MEC, an entity that takes care of the historical patrimony of Radio MEC, at the time had a room in the same building operating the radio and maintained a collection with almost 400 boxes file of historical material.

(HP) by John B. Thompson (1995) as a methodological possibility to weave these analyzes, since the books can be understood as symbolic forms. According to the author, all human production carried out under certain intentionality can be taken as a symbolic form and, therefore, capable of being analyzed through Depth Hermeneutics.

Oliveira does not fully implement this methodology in his work, leaving this in charge of future projects, such as that of Andrade (2012), who takes the Hermeneutics of Depth to analyze the work of Silvestre François Lacroix: *Essays on Teaching in General and Mathematics in Particular (Essais sur l'enseignement en général, et sur celui des mathématiques en particulier)*.

Andrade's work, besides focusing on the work of Lacroix, an important mathematician and thinker who influences Western mathematics, had a very clear methodological interest: to test Oliveira's proposition. What are the potentialities and limitations of HP's employment at all stages in a work of this nature?

Andrade's thesis was contemporaneous with the doctorate that gives base to this text and had some significant differences to justify the non-use of this hermeneutic process. While Andrade would take Lacroix's book, this symbolic form, as the guiding thread of his analysis, bringing the historical elements to compose the framework proposed by Thompson, we started from the opposite process. We would take the Minerva Project - an action with giant arms that lasted for more than 10 years - as the guiding thread of our endeavor. Among other sources, we would start reading these Radio classes as ways of producing Minervas, ways of evidencing language-games participating in this broad action that was the project and which, confirming some expectations, were extremely diverse and variable. This mark was so strong in our research movements that the title of the work tried to produce marks in the writing that evidenced this multiplicity "Minerva Projects: kaleidoscopic game box".

If, on the one hand, Thompson's proposal seemed to move from the edges to a center, that is, observe several aspects that some might consider as marginal or accessory to a more plausible analysis of the symbolic form,

The great methodological discussion about the possibilities of analyzing symbolic forms is to provide an interpretation that is "as close as possible" to what the interpreter understands to be the author's intention, presenting arguments that ensure that it is the most plausible among possible ones. (Oliveira, 2008, p. 34)

Our movement seemed to move in the opposite direction, a center, even if fleeting, moving towards the edges, to the dispersions, borders of these minerva projects, evidencing, whenever possible, their differences.

Our clear and simple language-games are not preparatory studies for a future regularization of language — as it were first approximations, ignoring friction and air-resistance. The language-games are rather set up as objects of comparison which are meant to throw light on the facts of our language by way not only of similarities, but also of dissimilarities. (Wittgenstein, 1963, §130).

In this process of similarities and dissimilarities between games, we also produce individualized readings of each one of them. There is, however, no such multiplicity, the

search for a totality, variety and variation is observed by its power of difference and not by the possibility of agglutinating it under the same object, concept: "the Minerva Project."

Since the work of Oliveira (2008), several other researches in GHOEM and HEMEP have been guided by the methodological proposal of Depth Hermeneutics, there is also a book especially dedicated to this discussion "Books, Laws, Readings and Readers: Exercises of Interpretation for the History of Mathematics Education" (Garnica; Salandim, 2016).

Faced with our choice during the PhD in not adopting HP - although we are inspired by the movements and looks pointed out by Thompson, given the great impregnation of these readings and discussions in the groups in which we participate, GHOEM and HEMEP - we perceive some differences in our processes and purposes. We have tried, since then, to theorize about a reading of these productions of the past inspired by a Wittgensteinian perspective, based on language-games and life forms. This text appears in this direction. More than explicitly discussing the materials of the Minerva Project - something done in the doctorate (Pinto, 2013) and in the article "Radio and Mathematics: a study on the Minerva Project" (Pinto; Garnica, 2014) of readings based on the Wittgensteinian perspective.

Some points about this perspective and the historiographical production

When a historian writes his works, what is the most appropriate verb for this practice: to discover, unveil, rework, manipulate, create or invent the past? In the work of GHOEM, HEMEP and some other groups linked to this area of research close to what has been called New History (MATOS, 2010), the past is a production of the present, since the guiding questions of the historian, his yearnings and research movements are in the present tense. Sometimes the distinction is made between history (what happened) and historiography (textual production about what happened).

On this distinction, Malerba (2006, p.18) contributes:

Following Walsh's reflections, Callinicos recalls that "history" covers (1) the totality of past human actions and (2) the narrative or the narrative we have constructed today, that is, "historiography." This ambiguity is important because it opens up two distinct fields of the philosophy of history. Such a study can be turned, as it was in the traditional form, to the real course of historical events, the history lived by the agents, in the sense of "historical experience." It can, on the other hand, deal with the processes of historical thought, the means by which history in the second sense arrives - or constructs - it. It therefore leads to both the philosophy of history and historiography.

As an example of this distinction in works of the History of Mathematical Education we have, for example:

This means that the historian always constructs his research object, and the past is never an object of analysis for himself. The illusion of the past as a given leads to an incorrect practice of historical making. (Valente, 2007, 22)

There are those who choose to talk about flesh and blood subjects and paper and ink subjects, in an opposition between the narrated and what happened "in fact":

[...] the man who tells himself is not the same man who lives, even when he tells his own life. When making memory or autobiography, the subject narrator does not coincide with the subject narrated, the subject of the narrative is not the same character counted. Because the subject of the narrative is a subject in a state of life, in flesh and blood, is a subject in which blood runs in the veins. The subject narrated is a subject in a state of speech, is made of paper, is a subject in which ink runs in the veins. The historian who intends to speak of the subject of flesh and blood, **will speak in truth of the subject of paper and ink** that reaches him through his distinct **forms of representation**, although these forms of representation allow him at least to ensure that his character really was part of the past. The historian will give him a new life, of ink and paper, although it is part of the reading agreement between the reader and the author of the historiographical text to believe that there it is spoken of the person of flesh and bone who once lived in the past. (Albuquerque Júnior, 2011, p.254, our bold).

Our inspiration in Wittgenstein - in his second phase - makes us problematize this question. For the Austrian philosopher there is no longer a biunivocal relationship between language and world. For him there are *games of language*, social practices locally situated - we would say - where language plays a fundamental role, more than that, it is constitutive of our lives, our *ways of life*. It makes no sense, in this direction, to presuppose a world without language, nor to dissociate it from our everyday practices. Any search in the opposite sense, for him, is vain, a false question, a false philosophical problem. In this way, trying to speak of history if not through historiography is to put ourselves in a metaphysical endeavor, like the search for an ideal (the past⁵) that is outside our language. We could question, returning to the above quotation, what is blood, flesh and bone other than words in *language-games*? This does not mean that we are proposing a non-existence of "materiality" but going against a "relationship" between language and world. To have such a relationship, we would be assuming distinct things that relate, on the contrary, we advocate for the non-apartment or distinction of things. We are subjects of language and any action of ours is given in these *language-games* in which we participate and are agents.

Still in this direction, we could ask: what is a historical fact but what is told about it? Was there an earlier reality, beyond the story, that one could seek - even by taking it as unreachable or unrecoverable? Another quite usual expression in works of history of Mathematics Education is "versions of the past". The past is taken as occurring at some earlier time, unreachable, unrecoverable, then the researcher produces - and his interlocutors narrate - versions of the past, as something epistemologically inferior to the "past in itself", to history. Such an expression, even if it tries to value these "versions" apart from what happened, causes a fissure in its legitimacy - some people categorize, for example, the 'sources' in primary and secondary, according to their possibility of approximation with the 'fact' ". Ambiguously, the search for legitimating these narratives (versions), differentiating

⁵ Article defined in capital letters emphasizing its uniqueness.

them from the "real" can cause the reverse process.

In an earlier text, given the false problem of speaking or seeking something that is enunciated as "reality in itself", we propose

a purposive confusion (or fusion) between history and historiography, since what happened, experience, "depends" for its existence on the narrator and, more than that, a language that evidences the experience of "such and such things," a public language, shared by a certain community that allows one to see, allows one to feel certain things. (Pinto, 2015, p.868)

This proposition does not point to the extinction of the expression "reality in itself" or of the obligation to merge "history" and "historiography", since these are also words of certain *language-games* that function in them without major problems. It points, rather, to a non-adequacy, according to our readings, of these words in *games of language* historiographics based on a Wittgensteinian perspective. Wittgenstein does not point out how language-games change over time, but the metaphor of language as an ancient city, as worked out by Antonio Miguel in Wittgenstein's "Historiography and Therapy in the City of Wittgenstein's Language" (MIGUEL, 2016) quite adequate. We can see in our daily games that some words and expressions are falling into disuse, become obsolete and replaced by others in a slow and gradual process, such as houses and streets in cities - as we believe to be the case here, by proposing such (con)fusion.

What for some may seem a preciousness of language, for us implies methodological options. If we reside in language, in language-games, all research is an investigation into language-games and produced within this or other games, there is no intention of overcoming them. In the same way, all reading becomes "just" a move in a language-game, there is not some kind of access to the game of the writer, but a production - in my own game or emulation⁶ of a game of others. We could borrow from Lins (1999) his way of conceiving the production of meanings as we have done in other works (Pinto, 2009, 2013, Garnica, Pinto, 2010), but we will limit ourselves in this text to indicate that the one who reads produces a text which says what the reader believes to be there (said). Wittgenstein proposes in an aphorism that we do not think about something, but simply look at how such a word or expression occurs - it is used - in certain language-games and the criterion of understanding "understanding is not a mental process" (Wittgenstein, 1963, § 154), but the proper use of the word or expression in a given game.

now, the criterion for understanding this sentence does not depend on the definition of these concepts. The definition is intended to eliminate language vagueness. But understanding is vague, that is, the grammar of understanding does not depend on a guarantee established by the definition. Understanding is autonomous. The "essence" of understanding lies in grammar and therefore does not concern any common essence external to the execution of language. (Hebeche, [s.d.], p.5)

⁶ In the reference thesis, as the main movement of data production, we emulated a radio discussion about the Minerva Project and its extinction. This fictional debate aimed to play the games of our deponents and the radio language at the same time, problematizing the themes that were expensive during the research.

The understanding is then given in the action undertaken upon hearing such a sentence. In other words, add the intention of the author, the subject, to the understanding of the game, since these are public, there is no private language. In that game, such a word is used in this or that way. When we speak of *language-games* in Wittgensteinian pragmatics, we are speaking in a broad language, surpassing what is usually called the language. Language involves the whole body, the most varied forms of this act performatively in their contexts, *ways of life*.

This may be the greatest difficulty in proposing to look at ancient textbooks from this perspective. It would be interesting for us, for example, to see how a classroom effectively acts along with a text, in other words, how this didactic material performatively affects those bodies in that *form of life and language play*. This action, by the way, cannot even touch something that some would call the author's intention. In this sense, understanding the *language-game (s)* of a specific classroom involves understanding the uses that are given in this space, *form of life*, and being able to act according to its rules.

Would it then be impossible to look at old books, no longer used in the classroom? We do not believe that Wittgenstein himself has consistently used textual references. He opens the "Philosophical Investigations," including a quotation from Augustine's "Confessions." In "Notes on colors" Wittgenstein criticizes with special emphasis the work "Doctrine of the colors" of Goethe. In this work the Austrian philosopher shows us how Goethe's notes, Lichtenberg, among others, disregard the everyday uses of words such as light, dark, white, translucent and others related to color and vision. To do this, however, it puts us in fictitious situations, commonly invites its reader to imagine such situations and calls into question the theories criticized.

We have recently been confronted more directly with this problematic of looking at texts from a Wittgensteinian perspective. In the work of Moreira (2018) we had the interest to look at two different textbooks of Euclidean Flat Geometry for the undergraduate courses in Mathematics, which was the text of João Lucas Barbosa and Eliane Quelho Frota Rezende and Maria Lúcia Bontorim de Queiroz. Unlike Pinto (2013), this work was delineated in the counterpoint of two texts, which held among them some of the titles "Flat Euclidean Geometry", and the use in undergraduate courses in Mathematics. We chose to try to show different rules and modes of use in both manuals. For this, we elaborate a "practical horizon": the formation of teachers of mathematics in undergraduate courses, that is, our reading was based on possible movements, performances provoked by these different books when entering a classroom of Degree in Mathematics, the which we chose to call "bibliographic therapy" (Moreira, 2018).

In the pages that follow we will bring some readings of a radio class of the Project Minerva. We will walk in a dispersive way, from the center to the banks. Not in the search for agglutinate aspects that help us to 'analyze more plausibly' this class, but in the explanation of games that are placed and in the tracing of traces and relations that can be

made with other games. The reader will not find here an analysis in the most classical sense of the word, although we could here advocate an analysis that is a subjective production of the researcher in producing readings.

Project Minerva Radio classes

As for the Minerva Project, we were able to put together in our research file only one radio-cassette in all its stages of production. This is an Analytical Geometry class for the Secondary Supplementary Course, developed in partnership with the Roberto Marinho Foundation.

These classes were elaborated in very complex movements and involving several personages, some of them, lay in the content in which they were working. Initially, a teacher of the specific area elaborated a sketch of class - Gross Text - that followed for two ends, to generate the Fascicle (kind of apostille) and the audio of the class (recorded in tapes to be transmitted in all national territory).

This last process seemed to us a bit more complex, by the number of steps: The Raw Text turned to Raw Material that was later transformed into a Script (or CCA-Communication with the Student) and only later it was recorded, generating the Audio File.

The Raw Text of this class was found in the box number 246 of the almost 400 boxes belonging to the SOARMEC collection. There are 15 typewritten pages with handwritten comments, in the last page we have a "summary" of the class, titled "MATHEMATICAL MEMORY CARD 59 STRAIGHTS AND CIRCUMFERENCES". At the beginning, we see the date next to the heading, "04/12/78", possibly indicates the moment of a review or the request for archiving. Annotated by hand in the corner of the page is the inscription "Fasc. 45", referring to the Fascicle to which this class would belong. There is also an indication of authorship, in this case: Paulo Motejunas.

In the process of research, we contacted Paul, who gave us an interview and reported a bit of how the process of producing this material was:

I was invited because I already had experience writing, although at this time I was working more with Physics. But on account of past experience, Goldberg invited me, and she gave me copies of the supplements from Brasília, Pernambuco, Paraná, São Paulo, Minas, Rio, and I did a survey to see what was more charged. Unfortunately, that's how it works, teaching works: you'll see what's most charged to see what's going to get more emphasis, even though we do not give up all of the content, right?! I had already taken course at Mackenzie, in high school, for exact. They were courses ... just to have an idea: those handouts of Cid [Augusto] Guelli, and other authors that was used at the time ... I gave a course of Geometry of Luiz Mauro Rocha⁷ all, that

⁷ Luiz Mauro Rocha, author of textbooks. Among his productions is a partnership with Ruy Madsen Barbosa and Scipione de Pierro Neto (the mathematical collection: modern high school course) and the book of individual authorship Geometry in Space, published by Nobel Editor in the 1960s.

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Geometry that today is not done more, to study the theorems, to begin to construct ... (Motejunas, 2012, apud Pinto, 2013)

Paulo tells us that he was a team of well-trained people, with extensive experience in content and with some experience in courses minimally related to a tele-education proposal (similar to today's Distance Education).

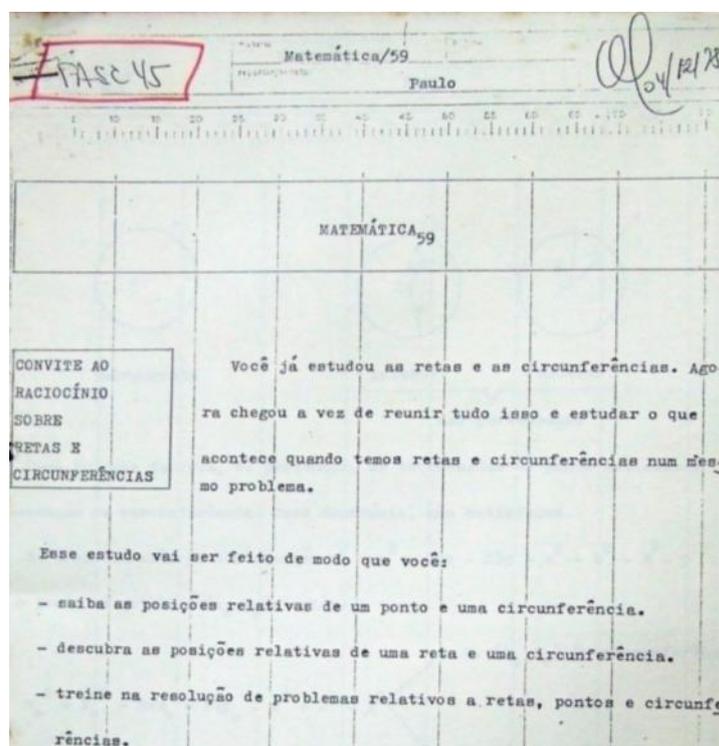


Figure 1 - Raw Text - class 59
Source: SOARMEC Collection.

Paulo tells us about the process of producing this material:

Production flow: I wrote, had no computer, was typewriter, page. I wrote, wrote, wrote ... there, I would send it to Maria Amélia, who is a Psychologist and PhD in education at USP. She would read it and say, "*Paulo, I do not understand math. If I can solve the exercises, it's because the class is good!*" The material stayed two days with her, which returned me and, if there was no mistake, I was already going to the Padre Anchieta Foundation. If not, he would return to the review, then go to Sangiorgi. From Sangiorgi to Ernesto, then the Boat and they, as well as doing the television part, read, and sometimes, from time to time, they said "No, this is not good" ... we had some obstacles there ... later, if I did not come back, I would go to Rio Gráfica Editora, there on Avenida Angelica, in São Paulo, downtown, where they called me for drawings doubts ... for example, I make a sinusoid. Today you play on the computer, it's easy. At that time, I had to take some books that had good drawings - "*oh, like this one*". It was all designed ... (Motejunas apud Pinto, 2013)

The cover of the Fascicle makes no mention of PMi, only on the back cover is a reference to "Radio: The Minerva Project. From the Educational Broadcasting Service of the Zetetiké, Campinas, SP, v.27, 2019, p.1-24 – e019020

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Ministry of Education and Culture, it transmits the Telecurso 2º Degree by the following stations, from 8:00 a.m. to 8:30 p.m. from Monday to Friday "(Pinto, 2013, page 21 - v. On the mathematics spoken...)

Another item that caught our attention is the numbering of Fascicles, which differs from the initial proposal in the Raw Text, in our searches, we find Fascicles in two versions: newspaper and magazine. Apparently, they started with the cheaper format, the newspaper, monochrome, and later migrated to the magazine in two colors, which certainly brought some changes in the numbering⁸. Paulo tells us that he was hired to produce these classes for the Telecurso, he did not know they would be used by the Minerva Project, but he, finding such use in our interview, saw no major problems, since he was hired to produce them for the foundation, being able to give the destiny that wanted to this material.

In this unusual situation, what most caught our attention is to think that the same Fascicle for the television, full of visual resources, was used for the radio. In addition, all student support for the work of content in this mode (radio) was given by the radio itself and not by the printed material. In other words, it was not the Fascicle that supported the class in the radio, but the radio that supported the class of the Fascicle. The author points out, however, that he had already worked with the individualized method⁹, based on Skinner's psychology, and that the material sought to be self-explanatory.

The comparison between Fascicle and Raw Text points us to small differences in writing, the biggest of which is due to the graphic quality of the print. Regarding the work done on Radio MEC, which aimed to produce the audio of the lesson, the movements are quite different.

⁸To compose with all the materials of the same class, we had to observe different classes in fascicles in newspaper (with a numbering of classes) and of magazine (with another numbering) to conclude that there were no differences in the text, only in numbering and quality material and printing. Thus, we were able to work with the "Equivalent" class 59.

⁹ Also known as the Keller method, it basically assumes three stages: programming, application and evaluation and reprogramming, all with numerous subdivisions. The method provides for the creation of instruction sheets so that the students, individually, can continue in the studies, counting on the tutoring of the teacher. In the method, it is stressed the need for continuous evaluation and with full utilization requirement (Cf. BULHÔES, s / d).

MATEMÁTICA 59

**CONVITE
AO
RACIOCÍNIO...**

SOBRE
RETAS E
CIRCUNFERÊNCIAS

Você já estudou as retas e as circunferências. Agora chegou a vez de reunir tudo isso e estudar o que acontece quando temos retas e circunferências num mesmo problema.

Esse estudo vai ser feito de modo que você:

- saiba as posições relativas entre um ponto e uma circunferência;
- descubra as posições relativas entre uma reta e uma circunferência;
- treine na resolução de problemas relativos a retas, pontos e circunferências.

PRIMEIRA TAREFA

DESCUBRA AS POSIÇÕES DA RETA EM RELAÇÃO À CIRCUNFERÊNCIA

1. VAMOS VER PRIMEIRO A RELAÇÃO ENTRE UM PONTO E UMA CIRCUNFERÊNCIA

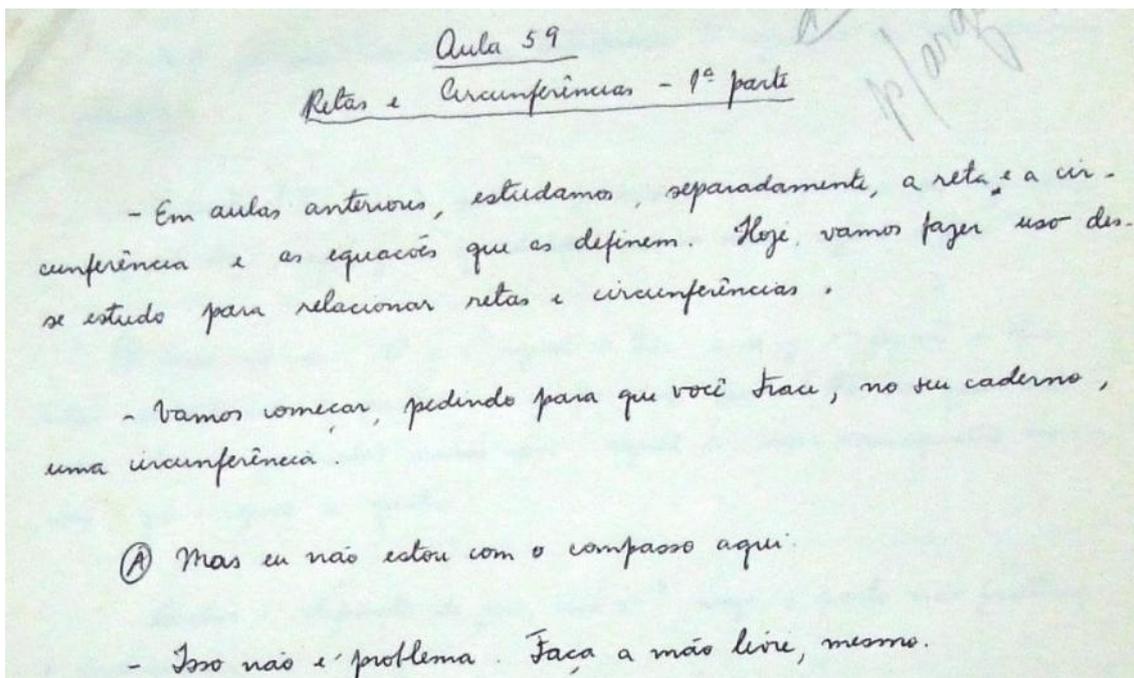
Um ponto, em relação a uma circunferência, pode ser:

Figure 2 - Classroom Fascicle 59

Source: SOARMEC Collection.

If the Fascicle was not directly oriented to guide a student who listened to the radio class, it needed to be shaped in this way: to guide the students in how to follow the Fascicle without the support of other visual materials - and here, we believe, the great potential of this material.

When entering the MEC Radio, the Gross Text (and in this case, we believe, with the already ready Fascicle itself) would go to the hands of a professional copywriter and / or a teacher of the area, the copywriter could even have no affinity with the content to be radio-tuned, to produce the Raw Material.



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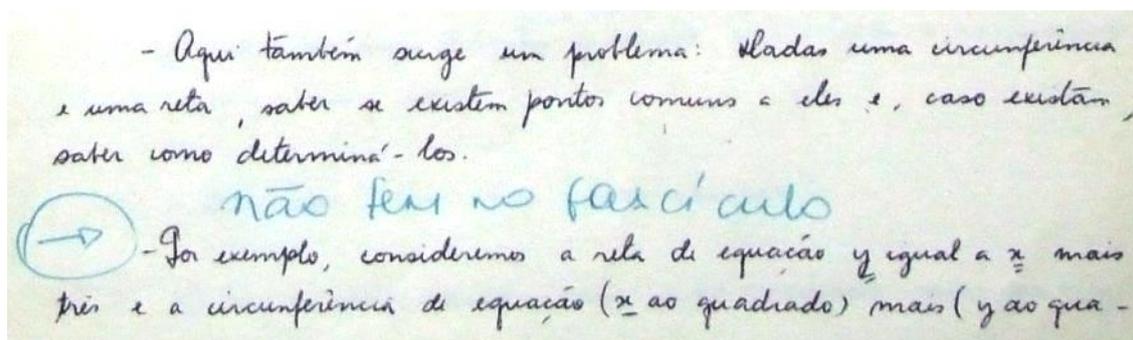
Figure 3 - Raw material¹⁰

Source: SOARMEC Collection.

If the beginning of the text seems to be just repeating the issue, in the following lines we see changes, there is an indication of action for the student: "trace a circle" and there is a student also in the narration, which says "but I do not have the time here "A situation certainly experienced by many who listened to the lesson. And the class follows in this direction, a teacher instructing a student (of the program and the students listening) to do something.

At the beginning of the class, the participation of the Student-speaker is very restricted, however, later, the student starts to ask the teacher-speaker some questions: "Let me see. The x is equal to three and the y is equal to two. So, by substituting x for three and y for two I have (three squared) plus (two squared) minus nine equals nine, plus four, minus nine, which equals four. "Or again in another passage:" Ah, which for the point belongs to the circumference, would this result have to be equal to zero? "

Eventually, we see through the notes, copywriter or teacher proposes something that is not in the Fascicle and that could generate some problem to the listeners:

Figure 4 - Raw Material¹¹

Source: SOARMEC Collection.

The process reported by Marlene Blois indicated that the Raw Text followed two paths, the production of the radio class and the Fascicle. Paulo Motejunas tells us that there were eventually some changes in the process of preparing the fascicles, in this case, at the request of the staff of the Roberto Marinho Foundation, which produced the material for television. The example quoted in the figure was not found in any other material that would

¹⁰ Class 59 / Reefs and Circumference - 1st part / - In previous classes, we study, separately, the line and the circumference and the equations that define them. Today we will make use of this study to relate straight and circumferences. Let's begin by asking you to draw a circle in your notebook. / (A) But I do not have the time here. / - This is not a problem. Make it by freehand,

¹¹ Here too a problem arises: Given a circle and a line, know if there are points common to them and, if they exist, know how to determine them. For example, consider the line of equation y equal to x plus three and the circumference of equation $(x$ to square) plus $(y$ to qua-

help us to understand its origin.

At times the speaker-teacher suggests that the listener accompany the explanations in the Fascicle and asks him to "do all the calculations in the notebook" (p.16). This shifting focus makes us think of a process of guiding the listening students in their class. It is important to remember that many students were alone accompanying this class, equipped only the radio and the Fascicle, trying to learn, in this case, Analytical Geometry. Already on the radio station, there was a Monitor, usually a teacher from some area or a person with "more education". We interviewed a Monitor from the city of Coxim (MS), but he worked on the First-Degree course, for him, already a teacher with some experience (later formed by Project Logos II, Author, Souza, 2015), having picked up a class still to be literate - which was not the focus of Project Minerva but rather of MOBREAL¹² - simply takes advantage of Fascicles and Radio class to launch their literacy classes. It is a process of subversion that illustrates, to a great extent, what on some level occurs in every classroom, even from the most controlled systems, and again indicates limitations of an interpretative process of didactic materials - as I argued previously. More than changing the focus of "teaching," Edvaldo and his group of students took advantage of the open gap for PMi to meet and discuss problems and local politics, something currently forbidden.

We can also observe the change in the form of writing, in a mixture of mathematical language and mother tongue, a hybrid language-game (like all, incidentally):

(A) x ao quadrado, mais $(x$ mais quatro) ao quadrado $\hat{=}$ igual a oito, ou seja, x ao quadrado, mais x ao quadrado, mais oito $\hat{=}$ mais dezesseis $\hat{=}$ igual a oito. Então dois $(x$ ao quadrado) mais oito $\hat{=}$ mais dezesseis, menos oito $\hat{=}$ igual a zero $\hat{=}$, portanto, dois $(x$ ao quadrado) mais oito $\hat{=}$ mais oito $\hat{=}$ igual a zero. Dividindo os termos por dois, temos que $(x$ ao quadrado) mais quatro $\hat{=}$ mais quatro $\hat{=}$ igual a zero. Resolvendo essa equação, tenho que $\hat{=}$ $\hat{=}$ igual a menos quatro, mais ou menos raiz quadrada de $[($ quatro ao quadrado) menos $($ quatro vezes um vezes quatro) tudo sobre dois, isto $\hat{=}$, x $\hat{=}$ igual a $-$ menos quatro mais ou menos raiz de zero, tudo sobre dois. Logo essa equação tem como raízes $($ menos quatro, mais zero) sobre dois $\hat{=}$ $($ menos quatro menos zero) sobre dois.

Figure 5 - Raw Material

¹² Brazilian Literacy Movement, predecessor to the Minerva Project, aimed at giving literacy to young people and adults, in Coxim it only arrives, however, a few years after the PMi. This gap is circumvented by Edvaldo Dias, informally setting up a literacy class by the Minerva Project. This is a very rich movement that marks huge divergences between Planned (in the Radio MEC of Rio de Janeiro and in Gabinetes in Brasília) and what happened in the corners of Brazil, even though there are several visits and supervision movements.

Here we see the author try, without specific resources, to print to the text marks that could become pauses, which usually acquire differentiations in the classroom, for example, in orality. How to differentiate the reading of $2x^2$ and $(2x)^2$? In some language-games that I participate in and some of which I researched in the master's program (Pinto, 2009), I can infer that a speech mode with pauses can differentiate them, such as: "two [pause] squared x" and "two xis [pause] squared ". In the usual classroom, the whole body is moved, speaking, pointing or even creating specific gestures, such as in a course of differential and integral calculus, thumb movements and indicators approaching and moving away, situated on abscissa and ordinate, may indicate variations in the domain and in the image to indicate limits, but how to print these marks for orality without automatically recourse to the formal language of mathematics?

We are not sure about the authorship of this raw material, particularly this class seems to have been produced by someone with some knowledge of math, given the care with language. Already for the creation of the Script (or CCA) according to our interviews, there was a team in Radio MEC of writers specifically hired for this purpose, usually, journalists. We had the opportunity to talk with Renato Rocha¹⁴, who was editor of several math classes and also found an interview for SOARMEC, which includes:

AO [Listening Friends of Radio MEC] - Guiaroni was responsible for the radio part. And the head of didactics?

RR [Renato Rocha] - It was teacher Solange Leobons, seconded by Marlene Blois and a group of pedagogues who approved of our scripts. And they also chewed the raw material, generated by outside teachers. Mine, for example, came from Belo Horizonte.

AO - How was the work of a copywriter?

RR - Each of us had to write 100 programs in all. Twenty per month. As I was the last to be admitted, I was left with what remained, the Mathematics course, that is, I was lucky enough to start with the most difficult: to make radiophonic a predominantly visual subject, like mathematics - and this is also the case with ballet, painting, chess, etc. It is possible to focus on aspects of these subjects, but they are not radiophonic subjects, for excellence.

[...]

AO - And what was the format of the programs?

¹³ (A) $x^2 + (x + 4)^2 = 8$, that is, $x^2 + x^2 + 8x + 16 = 8$, then $2x^2 + 8x + 8 = 0$, dividing the terms by two, we have $x^2 + 4x + 4 = 0$. Solving this equation, I have that x is equal to minus four, more or less square root of $[(\text{four squared}) - (\text{four times one times four})]$ all over two, that is, x is equal to minus four plus or minus root of zero, all about two. So, this equation has roots (minus four, plus zero) on two and (minus four minus zero) on two.

¹⁴ Renato Rocha is a former employee of Rádio MEC and was editor of the Mathematics classes of the First Degree Supplementary Course of the Minerva Project and participated in the interview we conducted with Marlene Montezi Blois in 2011.

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RR - The first ones were even classes, with professorial speakers announcing the content. Flat programs, for those who did not need those skills, and very useful for the interested listener. Then I started to play characters and experiment with radio skits, but the subject was very arid. I was working with the limitations and impossibilities of the vehicle. It was an ordeal, and I needed that salary. One day, through program 30, I hung a tape measure on the wall and with each program I cut an inch to see how much remained. When it was about forty, what I feared happened: I stumbled-I could not do it.

AO - What was the subject of the class?

RR - I do not remember. I think geometry. I simply could not ... The only thing to do would be to direct the listener to consult the file and ask the monitor for help, who listened to the programs with the student. When I went to deliver the scripts, I opened the game for the pedagogues and examined the raw material together. They agreed with me. We also checked out the material from the following week and found other content to hurt. Then I left, taking the material I had to work - we worked at home at that time - without knowing that I had created a deadlock.

[...]

AO - And how was the thing solved?

RR: Well, it seems like there's never been a problem like that. A few days later, they phoned me to come to the office of the Director of Radio [...]

AO - What happened in the office?

RR - I did not enter: the director was in the antechamber, already leaving, with some helpers. It was Avelino, a good-humored Paraiso. Knowing I was such a problem writer, he clasped his hands and made a mock kneeling, begging me to continue the series. It was a playful gesture, but full of symbolism. Remember that of the little soldier who refuses to carry out the order and ends up putting the general in check? Result: I was sent to Belo Horizonte to talk to the author of the raw material ... We examined the subjects of the rest of the series, talked about the limitations of the radio language, and suggested that she write with the blind listener in mind. Things have improved a bit, but to this day I do not know how I managed to complete the 100 programs. It is possible that these scripts still exist. It would be curious to read some today. (Rocha, s / d)

In their report is clear the difficulty in accomplishing such task, as well as the preference for mathematics by the writers. Here are two interesting points: the radio language and think of a blind listener¹⁵.

In order to get a more direct dialogue with the radio language, as mentioned by our interviewees, we sought help in two works: "Urgent manual for passionate radio" (VIGIL, 2004) and "Radio: 24 hours of journalism" (Parada, 2000). This is because, based on this idea of Wittgenstein's understanding of language-games, we wished not to explain the games that appeared to us - although we often do this and our approach to HP makes us tangle these questions - but emulate these games, or that is, to play them effectively, albeit in a textual

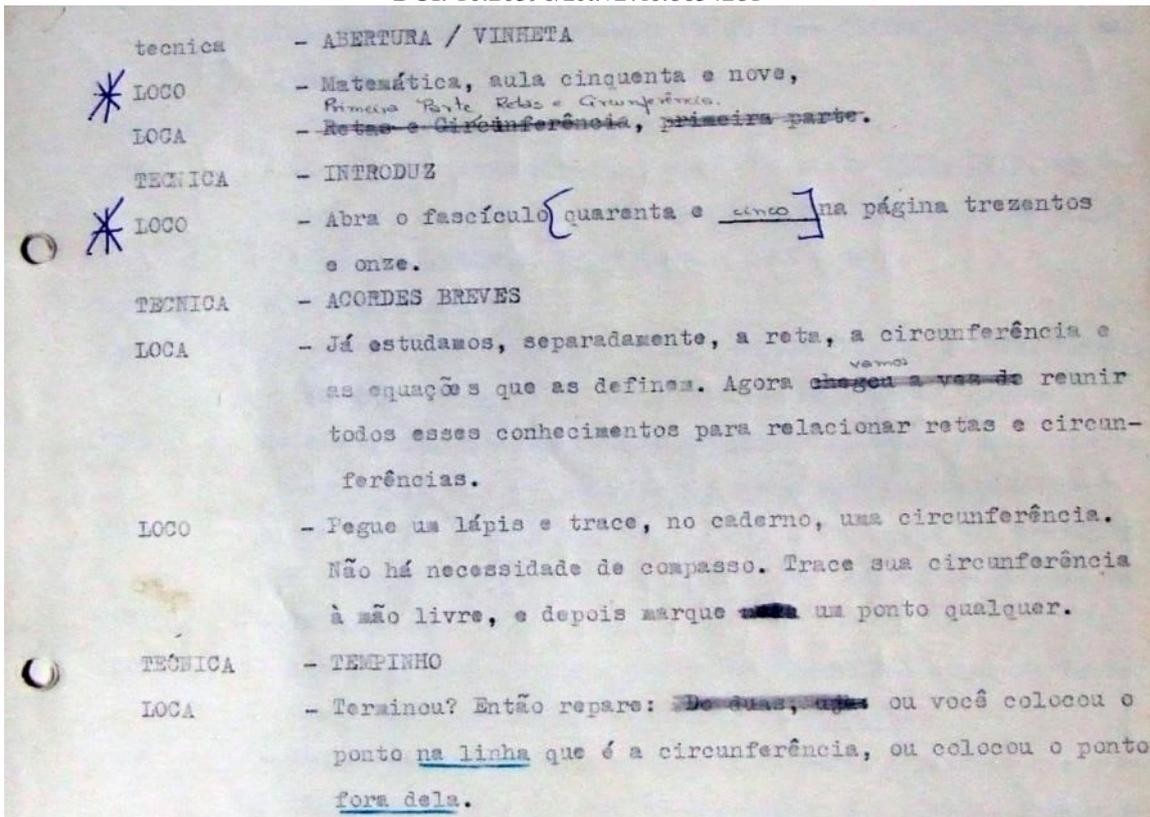
¹⁵ From the moment of the qualification of the work this theme has jumped in the eye, we have come to elucidate some possibilities of interaction including Inclusive Mathematical Education, so far, we regret, there are only a few ideas sparse and some ramblings, this Western mathematics is based on formalism and in writing, what would it be like to think of a conversion of this to a blind student? We think that this narrow view of mathematics would not suit this proposition, being better asked, what mathematics can be produced with blind students?

way and attached to some moorings of a scientific academic work.

And here is another hint of discussion. In *Philosophical Investigations*, Wittgenstein argues strongly that one learns to play "gambling," and exemplifies this by chess, card, ball, and so on games. In the game of chess, the pieces exert exclusive roles to this game, the horse, pawn etc. although they may have been inspired by everyday elements of other times and communities, have no resemblance to these that may help a future player to be a better chess player. Watching horses in the field will not help you better understand the function of the horse part in this game. Similarly, reading about the game of chess without playing it, without being put in front of the various traps that your opponent can do to you, will not make you a good player. However, you see, this does not mean that these readings, discussions around the game of chess are not interesting and cannot aid a player who "plays" effectively. Wittgenstein is not proposing that it is not possible to "reflect" on things, to talk about them, but emphasizes that these are other games, not that of playing chess. It turns out that these games are not disjointed, there are numerous similarities (such as family) and playing a game A, even if different, can help me to some extent to play a game B that bears similarities to the first. Maybe here would be a good possibility of rapprochement with HP. Thompson divides the analysis of symbolic forms into three movements: socio-historical, formal-descriptive, and ideological analysis. In the search to play or to emulate the game "proposed" by the author of a didactic book, the whole socio-historical context of the author and of circulation of the work can help us in the explanation / understanding of these rules.

Going back to our materials, after going back and forth from the Raw Material, the Script (or CCA), which was a material destined for another audience was established: radio announcers and sound technicians of Radio MEC and, for this reason, there were several inclusions in the material. If we return to the discussion of language-games and how they guide their grammars with our bodies, establishing performances, this is typically a text that proposes a normative and unambiguous set of rules to be followed:

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Figure X - Classroom script 59¹⁶

Source: SOARMEC Collection.

This text causes several people in different rooms (in and out of the studio) to move their bodies, talking, ordering their breath and tying their voices, pressing different buttons, in a synchronized movement that, if not perfectly executed, involved resuming everything from the start.

In addition to the opening inclusions, a first difference can be noted, there is a speaker and a speaker, making the two genres in the program represent. Marlene Blois, our interview and who has been in charge of the Project for many years, comments on the need for the listener to feel represented on the radio and, in this sense, also bet on gender identity as the source of this representation. If the Raw Material contained a teacher and a student, now a speaker and a speaker would share these speech roles. Another point is the withdrawal of student teacher verses, Allan Lima, also former employee of Radio comments in his interview to SOARMEC, pointing to a movement analogous to this change:

¹⁶ Technique - OPENING / VINEYARD / * LOCO - Mathematics, class fifty-nine, / LOCA - Part One, Straight and Circumference. / TECHNIQUE - INTRODUCES / * LOCO - Open the issue [forty-five] on page three hundred and eleven. / TECNICA - BRIEF / LOCA ACCORDIONS - we have already studied, separately, the line, the circumference and the equations that define them. Now let's gather all this knowledge to relate straight lines and circumferences. CRAZY - take a pencil and trace a circle in the notebook. There is no need for compass. Trace your circumference freehand, and then mark any point. TECHNIQUE - TEMPINHO / LOCA - Finished? Then notice: ***** Or you put the point on the line that is the circumference or put the point off it.

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It is evident that something presented to various voices and dramatized has much more charm than a program done with one voice or two. There is what we call the "program of the known", where the speaker knows and all the listeners do not know. I am referring to educational programs, type of testimony or lecture. The second primary program format is "The Ass and The Known". They are two characters: an interviewer and an interviewee - the interviewer is the "donkey" and the interviewee, the "known"; the interviewer is the one who does not know (position believed to be the listener), and the interviewee is the one who knows, and will pass on his knowledge to the interviewer and all those who listen. There is a much gentler way of transforming what has to be passed on to listeners, what has to be a positive message of teaching, of education, in the broad sense of the word, and which is much lovelier, much softer, and much sexier to hear: when there are several voices and especially when it is dramatized. (Lima & Oliveira, 2002).

Interesting aspect in reading this material is the way of writing 'x' and 'y', or 'r' (radius of the circle). Since the announcers were not teachers of mathematics, the *script* indicated: "this distance is less than R" (p.1), "y equal to x" (p.4). Again, thinking about how this text was intended to guide bodily actions within the studio, it was necessary for him to guide announcers to produce something that, when arriving at the radio station by the antennas and radio waves, produced unequivocal actions in the students of the Minerva Project. In this sense, the actions of these writers seem to us of immense complexity: to deal with several intermediate language-games to the action of the teacher, who elaborated the lesson plan, to the listening students, passing through the difficulty in making a typical visual content, radio elements that facilitated the accompaniment of the classes and kept the attention of the students and with a text that could be reproduced by the announcers in the mold of a classroom of mathematics.

At the end of the recording process, we reached the following audio material, which is now available through the qr-code below or the link next to it, for the reader, however, we bring the transcript of part of the file, remembering that the audio class was divided into two parts and we only had access to this first one. We suggest that the reader download the issue at the same address to accompany the audio:

Audio: <https://youtu.be/gCxxBDh2POM>

Female voices, in chorus:

_ Set the theorem and solve your problem, find solution, expression, operation. Prove for A plus B is always the best tactic, hit the math!

Male Voice:

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— *Mathematics class number fifty-nine, first part of the twentieth fascicle.*

Female Voice:

— *Straights and circumference*

Slow cadence of chords on guitar;

Male Voice:

— *Open the issue on page three hundred and eleven.*

Accelerated cadence of chords;

Female voice:

— *We have already studied separately the line, the circumference and the equations that define them. Now let's gather all this knowledge to relate straight lines and circles.*

Male voice:

— *Take a pencil and draw a circle on the notebook. There is no need for compass. (pause) Trace your circumference freehand, and then mark any point.*

Slow guitar pricking

Female voice:

— *Finished? Then notice: either you put the point on the line that is the circumference or put the point off it.*

Male voice:

— *If the point is in the line we say that it belongs to the circumference. Otherwise, we say that it does not belong to the circumference. (...)*

The scripts and the audio transcription of the lesson, although they may be similar in terms of the words they present, are extremely different normative language-games. The first set of bodies, usually standing, in a recording studio, makes them speak, pause, read the script itself, with a primary concern, the clarity with which words are pronounced and fidelity to what is written; on the other hand, we have sitting, quiet bodies, leaning on a table, with pencil, notebook and hand book, in the longing for explanations and procedures from this audio that provide some learning. The same words that make some talk, make others shut up, seek other meanings and imagine bodies for those voices who see on the radio. In this way, the phrase: "Take a pencil and draw a circle in the notebook" imposes rules of conduct different from those who read it in a studio and those who receive it on a radio.

To conclude, we would like to make some placements. Here we present a dispersive movement triggered by a radio-class of the Minerva Project. If at first, we might seem to be dealing with a Minerva Project and a crystallized teaching material, amenable to interpretation, we try to walk by dispersion, leaving the center in search of the edges, the different ways of reading these materials, all so diverse and yet, similarities. Each material, elaboration stage, is in a different language-game - albeit similar at various points in its writing - and moved bodies from different places and in different ways. The text "a point, relative to a circumference, can be ..." (without any voice associated with it) belonging to the raw text and fascicle would become the phrase: "Finished? Then notice: either you put the point on the line that is the circumference or put the point outside it "in the script (associated with a speaker, but still no voice) and audio (now with sound vibrations, breathing, tonic etc.). If we opted for other theoretical approaches and analyzed the mathematical content contained in them, we would have little to say. However, different language-games were mobilized in their works, Paulo, with his typewriter in ruled sheets and concern with "mathematical content without errors", his supervisors with his pens in search of conceptual errors, Renato (or other editor), who, regardless of any mathematical correction or incorrectness - a game he did not necessarily participate in - chose to elaborate a new phrase and put it in the mouth of a woman, the announcer, who spelled words that needed to gain special intonation, pauses that it was not written, and language-games that send listen to this last spoken text and produce relations with the printed text that was on the table. We point out, then, not to the unity or essential trait that could unite these texts, but to their dissimilarities and how they mobilized bodies of different forms, in different games of language.

Although with positivisms, cartesianisms and interpretive wills rooted in our bodies, we seek to practice therapies that try to decrystallize concepts, ideas, exclusive images that can make us see things in a single way.

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