

CONTRIBUTIONS OF THE LINGUISTIC TURN TO MATHEMATICS UNDERGRADUATE COURSES: A PROPOSAL FOR SUPERVISED TRAINING

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ABSTRACT

The present article presents the results of a study that articulated the framework of the Linguistic Turn and a proposal for planning and conducting a compulsory discipline in mathematics undergraduate courses - the supervised training. The philosophical movement known as the Linguistic Turn is, in this study, associated with the style of thinking of Wittgenstein's *Philosophical Investigations*, as well as with its non-referential compression of language. This framework can be unfolded as the symbolic approach to language and social roles, allowing another way to see assessment practices and school mathematics. The social perspective adopted in the planning of the discipline was founded, on the one hand, on the concept of "modes of address" associated with film studies and, on the other hand, on the aspects of Bourdieu's sociology.

Keywords: modes of address; linguistic turn; supervised training; symbolic violence; assessment.

RESUMO

Este artigo apresenta resultados de uma pesquisa que articulou o referencial da virada linguística e uma proposta de planejamento e condução de uma disciplina obrigatória em cursos de licenciatura em matemática, o estágio supervisionado. O movimento filosófico conhecido por virada linguística está, neste estudo, associado ao estilo de pensamento das Investigações Filosóficas de Wittgenstein assim como à sua compressão não referencial de linguagem. Este referencial pode ter como desdobramento a abordagem simbólica da linguagem e dos papéis sociais o que possibilitou um outro modo de ver a matemática escolar e as práticas das avaliações. A perspectiva social adotada no plano da disciplina teve como base, por um lado, o conceito de "modo de endereçamento", associado aos estudos de cinema e, por outro, aspectos da sociologia da ciência de Bourdieu.

Palavras-chave: virada linguística; estágio supervisionado; modo de endereçamento; violência simbólica; avaliação.

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1. Introduction

The purpose of this article is to present part of a research² which articulates a disciplinary program for supervised training with a theoretical framework which can be inserted among the contributions that the Linguistic Turn brings to the study of education (Veiga-Neto, 2007, p.1), especially to mathematics education. The Linguistic Turn, in the present study, is associated with Wittgenstein's (1889-1951) philosophy, particularly with respect to the non-referential understanding of language, which can be unfolded as the symbolic approach to language and social roles, as discussed hereafter.

The supervised training proposal under discussion emphasizes the social and symbolic dimension, presupposes the practice of language and it is in a line with postmodern prospects (Monteiro, Mendes & Mascia, 2010) and post-structuralist theories ((Miguel, Vilela & Lanner de Moura, 2011); (Wanderer & Knijnik, 2008)) which are intertwined, in this case, with the approach of Ellsworth (2005). Paraphrasing Veiga-Neto (2007), although not all authors cited in these studies have engaged in philosophical debates in favor or against the Linguistic Turn, or have explicitly addressed Wittgenstein's philosophy, one can say that they share the idea that "it is not possible that a type of thought and knowledge is not always committed to the position of the one who thinks, knows and speaks; it is impossible to think, know and speak irrespective of intermediations, interests, values and social forces" (Veiga-Neto, 2007, p.3). Under a philosophical perspective, these studies agree with the centrality of language in line with impossibility of access and the study of the matter itself, regardless of those who think about the matter and the fact. What is important about the matter itself or the brute fact, if there is one, is the symbolism. Within mathematics education, this approach meets ethnomathematics according to D'Ambrosio (2002), Monteiro (2004), Knijnik (1996) and Vilela (2013).

The relation of these philosophical themes with the discussion of supervised training is neither clear nor immediate, but it is, indeed, an aspect of Wittgenstein's philosophy, non-referential view of the language - a necessary assumption to the way of leading, understanding and selecting readings to supervised training practice. This method would find resonance in the formulations of Wittgenstein regarding its opposition to fixed signs, the fact of seeing meanings in practices where social and psychological aspects compose the symbolic value.

Indeed, the practice of supervised training in mathematics enabled the establishment of relationships between the course program and epistemological references that deny the search for recent fundamentals and the reference to a 'metaphysical realism', and fall among those which, as stated by Veiga- Neto (2007b), intertwine contributions of the Linguistic Turn with pedagogy and cultural studies. In this sense, this training proposal responds to the perspective of mathematics practice (Vilela, 2013).

2 This article presents part of the results of a research entitled "Supervised Training as a space for the construction of professional identity: Challenges of initial training for teaching" funded by Universal public notice 2011, developed by the faculty of the Department of Education Methodology (DME), 'Universidade Federal de Sao Carlos' (UFSCar), who work in the disciplines of supervised training in several undergraduate courses, including the mathematics course where I work as a teacher.

Supervised training in mathematics undergraduate courses is organized in four semestrial disciplines and is denominated Supervised Training in Mathematics for Primary Education 1, 2, 3 and 4, with workloads of 60, 60, 120, and 90 hours, respectively. The activities of the discipline in question occur at school, through the insertion of supervised students, future teachers, in the school network, and in classes at the university where theoretical frameworks are studied, and from which observations and rulerships are realized in school. The part of the research presented herein had as its main object a proposal for a Training 3 discipline program, whose denomination at UFSCar's system is "Supervised Training in Mathematics for Primary Education 3". For this exposition, distinction will not be made between the activities that occurred at school and those which were part of classroom discussion at college; however, it is important to note that the leading argument of this article, in the practice of school and university, is that of the supervised teacher, which is centered on the framework discussed in the present study.

In the present practice of Training 3, the central proposal under discussion is to promote a shift from current senses in the field of mathematics education by looking at the school from the perspective of the social sciences and cultural studies, seeking to see the school as a complex political institution in various dimensions. The central objective of the training was to present a way of addressing the social aspects of the teaching profession, focusing on the roles, of teachers, students and trainees. The concept of *social role* is present in sociological approaches, called "social interaction", which addresses trivial forms of social behavior in its relation to the context in which it occurs, a situated approach (Giddens, 2005, p. 95) that assumes shared conceptions about the social roles. I expected to clarify that "shared conceptions" refers to the social requirement, displacing from proposals of ethical-moral nature that involve mutual collaboration and assistance. The notion of social role, according to Giddens (2005), was extracted from drama and also favors the understanding of larger social systems and institutions and, in this particular case, helps us configure the political dimension of school and the social dimension of the position of teachers, students and trainees.

With respect to what is presented about the proposed program, the discussion revolves around, both in classes at the university as well as in the axis of observation and research in school, two topics approached in the course, taken from the Pedagogical Project of the Mathematics Undergraduate Course at UFSCar (2005): "educational resources", among which I selected filmic resources; and "assessment", which was also addressed by the idea of symbolic violence. The connection between these themes is the social and symbolic dimension of each one; they are linked with each other and with the perspective of the Linguistic Turn, as it will be clarified further in the text, describing the procedures and central aspects of these themes.

I emphasize that this approach is especially important for future teachers of exact disciplines, both the value and appeal of these objectives themselves and for the possibility to overcome dichotomies such as mind and body; theory and practice; methodology and content. Generality and universality are neglected in favor of singular situations, and this fact demands extensive repertoire and history. The classic idea of identity is compromised with the focus on roles that are not fixed in individual and temporal terms.

To this end, this article is initially organized by situating the theoretical framework adopted as a possible recent contemporary approach in the field of mathematics education. The starting point of this exposition is an understanding of Mathematics Education as a field with its specific characteristics in relation to the field of mathematics. In this context, aspects of Wittgenstein's philosophy that anchor the proposal of supervised training will be clarified: the symbolic and non-referential language. After that, the interest in such approaches for supervised training is justified based on previous researches from the undergraduate course at UFSCar. Therewith, I expect to justify the social perspective adopted, which is elaborated based on the "mode of address" theme as discussed by Ellsworth (2005), composing thus, within the theme of "filmic resources", the theoretical framework of the research.

In the last section, key aspects of the development of the training discipline will be outlined, restricted to the approach of the themes "assessment" and "violence" around their symbolic aspects, as this is the link to articulate the philosophical basis and the proposal of supervised training. With this, I expect to have brought to light a possibility to articulate the theoretical framework of the Linguistic Turn with a training practice which emphasizes the social approach and not the cognitive and psychological ones.

2. Mathematics Education as a field of practice and research: New references

Mathematics Education as a professional and research field is very recent, and it was formed based on the practice of researchers, with no prior epistemological preparation or normative criteria, an idealization or abstraction of the field (Miguel, 2007).

Currently, some researches in the area, this one in particular, monitor trends in the human sciences and, specially, in education, which in the case of this study takes the Linguistic Turn in philosophy and mathematical practices as a reference. These studies shed light on the contrasts between two fields which are marked, at the beginning of their establishment, by a relationship of subordination, specifically mathematics education in relation to mathematics.

In fact, according to Fiorentini & Lorenzato (2006, p. 18), the field of mathematics education was closely associated with psychology early in its constitution and, in Brazil, as of 1920, was composed of professionals involved with the teaching of mathematics, before which they wondered, mainly, how to do it. More recently, as of the 1980s, when it is possible to speak more specifically of an area called mathematics education, when educators begin "broad political, social and ideological discussions" and replace the question "how to teach?" with "why, what for, and who to teach?" (Fiorentini & Lorenzato, 2006, p. 34).

The present discussion is situated in the development of the inquiry area, as well as in the expansion of the theoretical framework and the "learning resources" that are more available to school mathematics education. The proposal for supervised training in mathematics aimed at being organized according to the perspective of non-referential, non-fixed language, and not independent of the practices. It clearly states that the training proposal is compatible with the assumptions of the Linguistic Turn, such as the symbolic language where meanings occur, not in an idealization or abstraction, but in practice, in *language games* (Wittgenstein, 2009).

In particular, training orientation would occur under a perspective of non-neutrality of knowledge in order to, on the one hand, understand and decode interests and values inherent in school and mathematics in school practices and, on the other hand, emphasize symbolic aspects of the roles of teachers, school, mathematics, etc.

In this perspective, this approach criticizes the cognitive approaches that constituted and constitute the field of education and particularly strengthened the formation of mathematics education as a field of knowledge. Alternatively, and in line with the post-structuralist framework, Miguel (2011, p. 8) advocates the "need to abandon the idea of mind", in favor of approaches that suppose not only the affective, social and cultural nature, but also admits, taking Wittgenstein's philosophy as a reference, that "these processes can only be incurred because of the existence of a shared public language":

It is the Cartesian illusion that makes us assume that our subjective processes, the modes we practice, occur in some *place* called mind, in some sort of inner world independent of language (Miguel, 2011, p. 8).

Thus, the theoretical framework of the present approach is not restricted to psychology and cognitive studies that see the student as an "apprentice" (Popkewitz, 2012, p. 177), subject to "scrutiny by the teacher," and seen "in relation to universal elements, regardless of their geographical location" (idem, p. 178), time, space, and their community. When considering the social and cultural conditioning, and questioning the rationalist and scientific optimism, notions of "social world and psychic world" are also considered (Ellsworth, 2005, p.63), which enables us to suspect the transparency of language and the control of ourselves, things, and relationships. With this caveat, the symbolic dimension of language, knowledge, and the roles that are played by each of us, in the different situations we live, can be considered. Language is considered in practice, language games, social practice, and not isolated from the situation.

The meanings would be, in the perspective of Wittgenstein, in a *Language Game* (Wittgenstein, 2009, §66), "the meaning of an expression is given by what we do with it, not by the hypothetical correlation between the expression and something of the world" (Pinto, *apud* Condé, 1998, p. 15). In paragraph 1 of the *Philosophical Investigations*, there is a criticism of the referential view of language (which he attributes to St. Augustine). For Wittgenstein, "" it is [not] the object for which the word stands" (Wittgenstein, 2009, §1).

If the word is understood as a sign, the sign would not have the function to substitute something in its absence, that is, the sign as a representation of reality. Two problems with respect to the use of representation: the representation being associated with the mental entity; a representation presupposes a referent. This is contrary to Wittgenstein's assumptions: the sign is not mental and language is not referential.

...one must always ask oneself: Is the word ever actually used in this way in the language in which it is at home?
What we do is to bring words back from their metaphysical to their everyday use (Wittgenstein, 2009, §116).

These two problems - the mentalist and the referential language - were attacked by Wittgenstein in the *Philosophical Investigations*. The mentalist, among others, is a hidden Wittgenstein's interlocutor in the *Philosophical Investigations*. The philosopher

traverses, speaks, and states these and other different ideas to leave and get rid of those transcendental, fixed or privileged images.

Almost all the usual spoken and written language is symbolic in nature. The brute fact, the nature, the platonic world, etc., if they exist, they are either a false problem or not a philosophical problem, in this new post Linguistic Turn configuration of philosophy. But discussing the function of philosophy is not our purpose, but rather understanding a referential view, which assumes that the meaning is previously fixed, external and prior to the linguistic practice. Language outside the linguistic practice would be, for Wittgenstein (2009, §38), the "language goes on holiday". Language is neither an abstract system nor an individual manifestation, but it can only be understood if anchored in its social dimension, reiterating the symbolic character of the philosophy considered in social practices, in linguistic practice.

Taking language as a reference for research, as opposed to referential language, may indicate or presuppose that more importance is being given to the nature of the environment (Rorty, 1994) and not to the "intrinsic nature". Language is no longer a vehicle that conveys what the mirror reflects; it is an alternative to the idea of representation presupposed in the idea of mind as a mirror of nature. Looking at the non-previously fixed language, but at the use and practices, does not imply denying nature, sensation, or experience. Because language is socially constituted, it relates to human dispositions on observable social situations. In other words, if the brute fact exists, it leaves the symbolism out, and therefore this knowledge does not contribute to important matters.

3. Supervised training and the mathematics undergraduate course

Previous researches³ carried out on the mathematics undergraduate course at UFSCar, indicated that the Resolution CNE/CP 2, 19 February 2002, which required a minimum of 400 credit hours of supervised training for undergraduate courses, significantly adjusted the curricular organization of this course. Table 1 shows the number of disciplines, credit hours, and hours of compulsory training of four different curriculum frameworks that occurred along the course, here characterized by the 1977, 1993, 2000 and 2004 organizations:

Supervised Training	
1977	8 credit hours - 2 disciplines - 120 training hours

³ Newly-PhD Teacher Support Integrated Program (PIADRD), UFSCar, Dec/2008 – Nov/2009; Research funded by Public Notice MCT/CNPq/MEC/CAPES n.-02/2010 entitled Mathematics teacher training: history of the undergraduate course at UFSCar and current policy (Formação do professor de matemática: história da licenciatura da UFSCar e política atual).

1993	6 credit hours – 2 disciplines – 90 training hours
2000	16 credit hours - 3 disciplines - 240 training hours
2004	28 credit hours - 4 disciplines - 420 training hours

Table 1: Credit hours and hours of compulsory training in curriculum frameworks of the mathematics undergraduate course at UFSCar (Germoliato, 2009).

The study indicated that the most significant change in the curricula in force throughout the course was the increase in the number of supervised training hours. This change has brought a significant increase in the number of pedagogical subjects (84%), impacted mainly by the 350% increase in training hours. It is worth mentioning that this radical and significant change in the performance of teachers of the educational field has not compromised the prevalence of mathematics specific disciplines in the undergraduate program.

This way, the alterations mentioned motivate us to study the potential of supervised training and how it has been conducted. A previous study showed that, when teacher training was primarily attributed to the professional mathematician, a technical teacher profile would have prevailed; the proposal was to train a professional "fundamentally prepared to perform in education", it was seen as a strong and deep training in the specific area, complemented by pedagogical techniques accruing from the field (Tacon, 2012).

It was possible to conclude, on the occasion of the completion of the studies aforementioned, and in line with the expansion of interlocution with areas other than psychology, the need for training in the humanities or, specifically, to address mathematics from a social standpoint, that is, to study the role of mathematics in the curriculum of basic education and the role of mathematics teachers. In this sense, I explain hereafter the aspects of the work carried out during training for two semesters in 2012 and 2013.

Indeed, the expansion of the pedagogical area not only fulfills a role of cultural formation and in human sciences, necessary and virtually nil in the different curricula analyzed, but also addresses the technical adequacy of future teachers to the labor market, emphasizing techniques, etc. The present discussion leads us to question about what type of education in human sciences the discourse produced by teachers of the pedagogical area would be fulfilling, or how seeing the world and be seen in the world would be associated with each of these discourses. In the present training orientation, within the framework of the Linguistic Turn, I aim at breaking with this practice-theory division and with a notion of reflexivity associated with the written expression of experience, which operates in the internal individual space and it is seen as committed to the modern *logos* and the Cartesian division between actor and spectator or theory

and practice (Leodoro, 2012). The approach through practice allows us to look at the social role of teachers as professionals situated in a historical and political context.

To that effect, among the general objectives of the training discipline investigated, I consider breaking with the technical view of training, which is present on other occasions (Tacon, 2012); to break with a naivety that the teacher, through dedication and vocation, using alternative methodologies, could solve or improve the teaching of mathematics.

In line with our theoretical framework, among the possibilities to analyze the "educational resource" theme more comprehensively, indicated in the program syllabus, I opted for the cinema. This option is aligned with the discussion about formative fertility through cinema, literature, historical analysis, and works of art under the perspective of cultural education and the human sciences (Alcazar, 2012; Fabris, 2008; Piccolo, 2010). As this is also a comprehensive approach, in this article I chose to present aspects of *mode of address*, as discussed by Ellsworth (2005), which comprise the theoretical framework of the research. I would like to clarify that, besides the following theoretical discussion, the proposal of supervised training also introduced, within the discipline, films as a didactic resource and discussions through them. However, in this article, only one will be timely mentioned, without the discussion it deserves.

Hereafter we indicate what and how the cinema theme was addressed in training practice; in this regard, the idealization of the dialogue in the educational environment will be highlighted as a deployment of non-referential and symbolic language.

4. Modes of address

The term Modes of Address originates in the studies about the cinema, or in the words of Ellsworth (2005, p. 9), "Modes of address is something from the cinema", which she also appropriated into the educational field. Despite being quite different fields, the association makes sense when one considers that teaching and learning do not occur in the "absence of pleasure, plot, emotion, metaphor, cultural artifacts, and involvement and interaction" (Ellsworth, 2005, p. 10-11).

Ellsworth (2005) says that the term "mode of address" can be summarized as: "Who does this film think you are?" The author explains that, when making a film, assumptions about "who its audience is" (Ellsworth, 2005, p. 14) will define several important aspects of the film, such as narratives, finishing final effects, etc. Based on the design of the audience's profile, it is as if the film, indirectly and subtly, called the spectator to themselves and to the film, as if saying: "Hey you out there!" (Ellsworth, 2005, p. 14).

However, to generate a desired identification between the film and the viewer, with a character, for example, the spectator must surrender, viewers must get involved and "join a particular relationship between the story and the imaging system of the film" (idem). In this sense, the mode of address is not preferentially located in the film, but in the relationship between the film and the audience. It occurs that the reception of a film depends also, and fundamentally, on the individual who is watching it, on their inner dimension. "Viewers are never, only or completely, who the film thinks they are"

(Ellsworth, 2005, p. 20). From the author's argument, one could conclude based on the present emphasis that "Hey you out there!" does not coincide with "Who, me?"; they are both in a "negotiation" in the situation. "Because, in the same way that viewers are never exactly who the film thinks they are, also the film is never exactly what viewers think it is. There is never a single, unified mode of address in a film" (Ellsworth, 2005, p. 21). The quote refers to the practice, the situation, and the non-transparency of communication, or the illusion in relation to the range and potentiality of dialogue in the educational field. The dialogue - almost a common sense in education - can be seen as expressive of a view of language as communicative, direct, and not as constitutive, obstructed and symbolic, and even naive with respect to low or nil emphasis on the social and unconscious components:

It is assumed that the dialogue is capable of everything: from building knowledge, solving problems, ensuring democracy, deploying cooperative processes, ensuring comprehension, building moral virtues, and diminishing racism or sexism, to satisfying desires for communication and connection (Ellsworth, 2005, p. 66).

Ellsworth (2005, p. 66) explains that the dialogue, with a "transcendental status", as a supposedly neutral conductor of meaning and intention, often appears in educational practices. According to Ellsworth (2005, p. 66), this - dialogue capable of everything - would be a historically structured mode of address, conditioned by particular interests.

Of what has been mentioned, two aspects, non-dissociable, of the term Modes of Address within the school setting deserve explanation.

The first aspect concerns the way the teacher, trainer, or basic education, see their students; the responsibility of the teacher regarding the future-teacher student: *What do you, teacher, think your student is?*, an apprentice (Popkowitz, 2012) or a student? What students are able to understand and what they need to understand, in this conception of modes of address, would be implicit in different circumstances of school practice. About this, one can mention the risk of depreciating or overestimating the ability of students, and also the expectations of teachers, projected in a dichotomous way to prepare and conduct their courses, which values students who are obedient or critical, active and resistant or subservient, in an individual and psychological record.

The second aspect concerns the mismatch between intentions (of the film director or the teacher) and reception (by the spectator or the student) or, to put it another way, it is the assumption about the non-transparency of dialogue, which Ellsworth (2005) calls dialogue or obstructed communication. The author states that obstructed communication involves the relationship between the social part and the individual, the outside and the inside, the social world and the psychic world, and the film script and the experience of viewers; that is, it takes into account not only the social and psychic worlds, but also the space between them, in social practice.

In this sense, the concept of mode of address by Ellsworth (2005) allows us to observe the limitations on the belief in reason, as well as the dimensions of practice that began to be considered: the importance of the situation for significance. From this premise, the symbolic dimension of knowledge and the roles played by each of us in the different situations we live can be considered. Ideas that somehow compose the educational system, such as control, punishment, dialogue, intentional transformation, etc. are under

suspicion in this scenario. Also, agreements, negotiations, and sharing should be seen in their dimension of roles and, therefore, with their own necessary hierarchies, and not in a utopian equality.

Just as "the film is never exactly what it thinks it is"; the spectator is never exactly what the film thinks they are, and the same occurs for the context of school education, "things are not what they seem to be" and, in practice, there is interference between what is said by someone and what is understood by someone else:

What prevents the teacher from reaching prescribed pedagogical goals, such as educating a virtuous individual in a good society, is the gap between perception and consciousness - and this space constitutes "an obstacle to transparency" (Bahovec, 1967, p. 163). It is an obstacle that also impairs the possibility of total surveillance (Ellsworth, 2005, p. 68).

Donald (1992, *apud* Ellsworth, 2005) argues that nobody has discovered "exactly how social norms affect the texture of our experience or how they are transformed this process" (Ellsworth, 2005, p. 92). It's not just what occurs in the spaces between the social part and the individual, perception and consciousness, it escapes direct control by the teacher (from the outside), but it is also impossible to be understood by the individual in question (from the inside) (Ellsworth, 2005, p. 69).

This statement is fertile when brought to classroom practice. On the one hand, it can be thought on the teachers, their classes, their intentions, and their teaching places, that is, their role and all the symbols related to this role - authority in the classroom, which differs them from the individual who is occupying this place, the singular of this person is relocated, resized in that role full of senses; on the other hand, students who perceive and receive from their role (outside) and mode (inside). The core is a social practice in action.

The role played by the teacher, determined by social and collective dimensions, filled with symbols and representations, as well as the psychic dimension of the student with its marks and weaknesses, help us understand that the importance of the situation in the relationship "between the teacher's curriculum and the student's understanding" is not "unilateral" (Ellsworth, 2005, p. 65). Within the framework of action, they can be understood in a non-neutral dimension of language, the obstructions of a dialogue, particularly in the classroom:

The dialogue in education is not a neutral vehicle that carries the ideas and understandings of those who speak back and forth, through a free and open space between two points. It is a vehicle designed with a particular task in mind, and the rough terrain it crosses between speakers, creates a constantly interrupted and never completed passage (Ellsworth, 2005, p. 66).

The author concludes that the dialogue is not a supreme achievement of Western Civilization, but mostly a constituted mode, politically interested, which presents relationships, including educational, simplistically. This clarification accompanied the proposal of training practice in the critical and affirmative senses. Critical to approaches that operate in the individual internal space, previously mentioned (Leodoro, 2012), in which language is understood as a transmission means, transparent and harmonious. Critical also of the idea of writing that promotes this mode and constitutes this cognitive subject, learning scientific knowledge and related behaviors in a supreme direction.

Such practices seem to presuppose a path, said the best, and definitive solutions to guide the future teacher on what to do and how to proceed. Every discourse does produce effects and condition behaviors (Veiga- Neto, 2007). Therefore, it fosters educational development beyond a definite, naive solution. Veiga-Neto (2007, p. 52) states, having contemporary documents that were analyzed under Foucault's perspective as a reference, that this discourse [of documents] establishes some "manners of conduct that not only establish specific types of pedagogical knowledge, but also productively capture these teachers to the state." I relocate his words taking the training practice, object of this research, as the focus, signaling that there are risks, through discourses that emphasize the gift and vocation, to constitute a type of teacher and establish some "manners of conduct that firm specific types of pedagogical knowledge and also productively capture these teachers to the state".

This language notion, proper and capable of free, transparent communication, opposes the view that permeates this article, developed based on Wittgenstein's framework of constitutive, symbolic language (Vilela & Mendes, 2011). In this sense, it should be clarified that it is an ethical, but not dogmatic attitude. Another possibility to justify the rejection of this option, which will not be explored in the present article, involves the articulation of this reflective mode with the purposes of neoliberalism⁴.

The non-neutral and obstructed dimension of dialogue, consonant with our conception of language, is viewed positively in at least two senses. First, the centrality of practice as background in identifying roles. Regarding the roles, students can perceive in these studies and discussions the importance of acting in complicity with teachers to the detriment of their statuses of students. Secondly, the study of modes of address assisted the understanding of violence phenomena in school because of its social and psychic dimension of understanding these phenomena.

4.1. Procedures and themes conducted in training practice: Symbolic violence.

I hereafter briefly outline how the supervised training was carried out that semester, presenting the central texts and the way symbolic violence and assessment were articulated. For a social approach to mathematics in school, I opted for the perspective of Bourdieu (1993), by which school mathematics is seen as an arbitrary social concept (Nogueira & Nogueira, 2007) and assessment is permeated by implicit criteria, that is, school mathematics and assessment as symbolic violence.

In this article, the articulation of the discussions of mathematics education, Wittgenstein's philosophy, Bourdieu's theory of practice, have the centrality of practices as their common axis, which enables us to look at the symbolic aspects of language and mathematical knowledge. From a methodological standpoint, this approach considers that the theory neither describes, nor prescribes, that is, it does not indicate solutions that presuppose the possession of the truth. The theory is seen as a model that helps us look at the object *differently*, another way to see, which allows an extended understanding of the phenomenon (Vilela & Souza Neto, 2012).

⁴ See (Peters, 2010); (Popkwitz, 2012).

In order to reach an understanding about symbolic violence and the connection of this approach with assessment, I chose to address the issue of violence at school; to this end, two texts by Charlot (2002; 2009)⁵ were initially selected.

To keep the line of argument more obvious, some parts of the theme are not discussed in this article. I only mention that Charlot (2002) organizes his text addressing three types of violence: "violence in the school, violence to the school, and violence by the school". The assessment theme is also analyzed through the view of symbolic violence and violence of schools. The discussion about violence in schools has brought scenes of the history of education in Brazil: punishment with ferule, kneeling in corn grain, etc. It is known that, in the public schools of the imperial time, physical punishment and the use of ferula were institutionalized. The suffering imposed by this punishment was caused by spanking the palm and also by the terrible power threat of the object exposure: "What a terrible sweat was caused by the exposure of that handcrafted ferule with smooth, rounded ends" (Gomes, 2013).

Despite the suffering and violence, the effects achieved by this method of controlling discipline and behavior in schools did not achieve its purpose. Although it could momentarily get students to behave or be silent, negative effects arose from inside and outside the bodies, with some traumatic marks that, among other effects, discouraged the stay in school. With this, it is possible to make it clear that violence in school or specifically, an act considered violent, caused by a student or a small group, cannot be solved simply with chastisements and punishments. Attempting to understand, together with students, why punishments are ineffective, I have turned to the *mode of address*, in its aspect of interaction; from the roles and obstacle to transparency. One way to understand violence, keeping away from the individual and control sphere where physical punishment is situated, is to relocate the matter in terms of roles. In the training discipline classes, we conducted the discussion following the steps mentioned ahead.

The motto adopted to explain why punishments are not effective is found, in this case, in the idea of *modes of address* and, specifically, in the aspect of this concept that does not detach the meanings from the practice, and this includes taking into account the people involved in this action and what occurs in the inside and outside, that is, it considers the psychic and social worlds that compose people as manifested in the practices, where not everything is rationalizable, and there is no absolute control, neither over themselves, nor over the others. The performative dimension, not only the action in practice but the similarity with the theater, emphasizes the roles symbolically imbued with the power that belongs to them.

During training, in the observations of the trainees on the issue of violence to school, a case in which two students set fire to a wastebasket causing disturbance in the school was narrated. Yes, this is an attitude of violence to school as a whole, i.e., an attack of violence against the institution, the principal, colleagues, teachers and staff (Charlot, 2002). Considering, according to Charlot (2002), that aggression is a psychic disposition, a reaction to frustration, we sought ways to understand this act of violence by asking ourselves to which frustration is that reaction of violence aimed at. The

⁵ Because Charlot disagrees with the thesis of social reproduction by Bourdieu (see Charlot, 2009), it is important to note that, regarding this aspect of assessment as symbolic violence, Charlot agrees with and cites Bourdieu; therefore, no theoretical inconsistency is observed here.

manner of conducting the question was inspired by an example from the film *Coach Carter* (USA, 136 min, 2005). In this film, and from the interpretation produced by Pereira and Andrade (2007), who takes Bourdieu's theory as a reference, the aggressiveness of the student would be directed to the school and to those who occupy authority roles in that institution.

In this regard, and given the reference of the present discussion, we can ask: Who is the attack being directed to? According to Pereira and Andrade (2007), one could speculate that it is a reaction to a school that did not fulfill its promise, for instance, to ensure the social ascent of those who studied there. Schools often do not prepare students for their future, so they go to school, but do not know why. Paradoxically, schools not always provide social integration, and rarely modify the framework of social inequality. The theory of social reproduction of Bourdieu and Passeron (2009), subjacent, in this context was articulated in the training practice through the violence theme.

Considering the same reference, the notion of assessment as symbolic violence will be emphasized later in this article. About this, we clarify that it is not a matter of advocating against school assessments, but seeing them from the perspective of the human sciences as ways of control, and production and imposition of rules; but above all, as conditioned by social and unnatural standards. Thus, the social aspects of our attitudes are evidenced, in this case, the social conditioning present when we evaluate, and also the rules: right and wrong, true and false, depend on a collective agreement, a belief that seems natural but is essentially social.

4.2. Assessment and symbolic violence

In the discipline of supervised training, the study on the assessment theme is organized in three axes. Initially, general aspects such as school assessment tools and types of normative and formative assessment were addressed (Darsie, 1996, p. 50). From this, we situate the ideal of fair, impartial, and rigorous assessment to then indicate, according to Bourdieu's theory, the implicit aspects of assessment that compromise this ideal. In this article, the last two axes are emphasized.

Throughout the discipline of supervised training, the idea was to search for situations, remote or recent, where normative and formative assessments were in force, as well as the presence and characterization of the assessment tool and its purpose and range. The text of Valente (2008) enabled us to see, historically inserted, the oral and written examinations as assessment tools that are so familiar to us today, and it also allowed us to address an ideal of "fairness, impartiality and rigor" prevailed in the assessment that would be guaranteed by the presence of an external examining commission. According to Valente (2008), it took many years until the classroom teacher gained autonomy to prepare, apply and correct the tests of their own students, because this process could generate suspicion with regard to the ideal of "fairness, impartiality and rigor".

This discussion with the trainees helped evidence that the claim to fairness, impartiality and rigor does not take into account implicit criteria and social inferences when assessing, as clarified ahead.

By supporting the assumption of school equality and homogenization, the social and cultural differences are ignored, as well as the consequences of these differences in the

school setting. Furthermore, in relation to assessment, it is assumed that through exams and tests, and using the same criteria for all students, it is possible to achieve an impartial, fair and rigorous assessment through which students would not be submitted to subjective criteria.

However, according to Nogueira & Nogueira (2007), Bourdieu looks at the cultural assumption of school equality and homogenization. He notes that the school incorporates the culture of the ruling class and thus the curriculum would be a cultural arbitrary concept imposed in the form of a disguised universal culture. Thus, school culture favors the ruling class that has familiarity and resourcefulness with this school culture. Nevertheless, students from different social classes, who therefore have different symbolic and cultural capital, certainly do not cope in the same way with what is privileged in school practices. Thus, implicit criteria that value "the domain of a set of cultural and linguistic references" come into the picture (Nogueira & Nogueira, 2007, p. 40) and jeopardize assumptions such as impartiality.

This presents implications such as social exclusion through school, including the evaluations. Moreover, failure is not thought of as a relationship between the school culture and the students' culture, but is seen as a lack attributed to the students and their families (Molina & Marquesini, 2006).

In the theory of reproduction of Bourdieu & Passeron (2009), before the right of everyone to access to education, an early elimination occurred, that is, exclusion came true even before school entry. However, after the access of the masses to education, this elimination was replaced by a mild, even unnoticeable deletion, so that students were excluded in subsequent levels of schooling. This mild process would be a period of stigmatization, causing the student to accept that the limitations are of personal nature.

Assessment, in turn, takes into account not only the domain of the transmitted content, but also the relationship that students have with the school culture, that is, implicit aspects such as verbal dexterity and resourcefulness with school knowledge. This is understood as symbolic violence.

The purpose is to devise a plan for the discipline of supervised training that emphasizes social aspects related to mathematics class, specifically to understand, from the proposed framework, assessment as symbolic violence by the school and mathematics as a school discipline, with its traditional repertoire, its weight (in failures), and its space in credit hours, as a cultural will and an interested choice. Thus I seek to highlight the symbolic aspect of the roles, knowledge, assessment and violence, rather than the reference to a domain of knowledge, conduct and thinking of teachers isolated from their practice.

5. Final remarks: The symbolic language and the role of the teacher discussed in training practice

The purpose to devise a course plan for the compulsory discipline of mathematics undergraduate courses - the mathematics supervised training for basic education, aimed to articulate the themes proposed on the syllabus, among which studies on assessment and violence were highlighted, with the theoretical framework of the Linguistic Turn. Especially, the present discussion is situated in what I call philosophy of mathematics

education and in what Veiga-Neto (2007) sees as an interlacement of pedagogical studies and cultural studies, arising from contributions of the Linguistic Turn. Although this article does not intend to directly discuss the movement which became known as the "Linguistic Turn" and the philosophy of Wittgenstein, the aspects of this philosophy that permeates the present approach involve practice and symbolic language. This raises suspicion on the primacy of the psychological, individual and cognitive approach in education, and the denial of transparent and communicative language.

In line with the style of thinking of the Philosophical Investigations by Wittgenstein - rather than the searching for definitive answers, indicating ways and pointing out truths - it is not the case to evaluate my own practice of proposing and conducting the discipline, which is naturally committed to my intentionality, but to explain the fertile articulations of this interlacement. Regarding this, I highlight the potentiality of symbolic language, not only the use of films, which interact very well with the framework of this article⁶, the use of "modes of address: something from the cinema; something from education, too" (Ellsworth, 2005); decoding values and ideologies; the performativite approach of practices over the knowledge domain, i.e., seek explanations in action through social agents and the roles, and not through idealizations detached from the contexts.

The present perspective of training aimed to cover the social approach and the psychic dimension that favors reviewing naive training practices with respect to language conception. For instance, I see it as transparent, through a dialogue that can do everything. Especially, I mention that the situated approach that assumes shared conceptions about social roles, taken from Giddens (2005), obviously differs, from the assumption of power relations imbued in the roles, and the social dimension of shared moral conceptions that presupposes mutual assistance, sympathy and collaboration that conceal conflicts and disputes.

To finalize I emphasize which way to conduct this research evidences the autonomy of the issues of mathematics education in relation to mathematics; that is, the questions formulated and the problematization in supervised training practice see mathematics not from inside its logic and the language game, but see school and mathematics inside and outside school, through the lens of sociology of science and philosophy. In the organization of the four supervised training practices for the undergraduate mathematics course, my colleagues and I tried to carry out a study of the environment, that is, from the surroundings into the classroom and the possibilities of approaches of contents and methodologies. In this article, I presented a way to look from the outside, showing the trainees, future teachers, in a style of thinking typical of the Philosophical Investigations, *another way to look*; in this case, school mathematics could be understood from the perspective of the sociology of science.

With the framework previously discussed, violence and/or resistance can be thought in practice, in "terms of what happens in the space of the difference between the outside and the inside" (Ellsworth, 2005, p. 63). Resistance is sometimes pathologized: a dysfunction in their ability to learn and not as resistance placed in the form of violence.

⁶ See, for example Leodoro (2012); Fabris (2008).

In this proposal of supervised training, we aim to decode values, explain beliefs, analyze possibilities of a rational pedagogy (Nogueira & Nogueira, 2007), which is also appropriated by students in their academic life. In the rationalization of teaching, we seek to make the implicit, explicit, which enables us to know the valorized code and the possibility of appropriating it.

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