ZETETIKÉ

DOI: 10.20396/zet.v29i00.8661833

The mathematical specificity device and the production of the subject-teacher-of-mathematics

Dispositivo da especificidade matemática e a produção do sujeito-professor(a)-de-matemática

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Abstract

This theoretical essay aims to discuss the mathematical specificity device operated by mathematics teachers. The construction of our argument was based on concepts from the foucaultian toolbox and focused on studies dealing with Mathematical Knowledge for Teaching, the Mathematics Teacher's Specialized Knowledge of the and Mathematics for Teaching. To problematize the discourse of specific mathematics to teach made it possible to identify the main strength line of the device: the existence of specific mathematics to teach. This, in turn, entangled in the network that constitutes the device produces forms of being-a-teacher-of-Mathematics, within the game of power relations that intends to guide the conduct these teachers.

Keywords: Device; Discourse; Teaching; Mathematics.

Resumo

Trata-se de um ensaio teórico que tem como objetivo discutir o dispositivo da especificidade matemática operado por professores de matemática. A construção da nossa argumentação apoiou-se em conceitos da caixa de ferramentas foucaultiana e incidiu sobre estudos que tratam do Conhecimento Matemático para o Ensino, do Conhecimento Especializado do Professor de Matemática e da Matemática para o Ensino. Problematizar o discurso da Matemática específica para ensinar possibilitou identificar a principal linha de força do dispositivo: a existência de uma Matemática específica para ensinar. Esta, por sua vez, emaranhada na rede que constitui o dispositivo produzem formas de ser-professor(a)-de-Matemática, dentro do jogo das relações de poder que pretende conduzir a conduta desses professores.

Palavras-chave: Dispositivo; Discurso; Ensino; Matemática.

Introduction

In this article, we present a study that problematized the network of relations that can be established between discourses that deal with a specific Mathematics to teach and different

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Sent on: 30/10/2020 – **Accepted on**: 01/02/2021 – **Published on**: 29/05/2021

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DOI: 10.20396/zet.v29i00.8661833

elements that make it possible, such as: documents, institutions, laws, scientific statements, among others. Here we understand discourse based on the studies of M. Foucault, for whom the understanding goes beyond the use of signs to designate things, by treating it as "practices that systematically form the objects they speak about" (Foucault, 2016, p. 60).

This understanding of what is discourse allows us, for example, when we hear the word apple, to associate it with fruit, but also with sin or a gesture of pleasing a teacher. Although he does not deny that discourses are made of signs, Foucault (2016, p. 60) highlights that they do more than use signs to designate things, making them "irreducible to language and the speech act." In discourse analysis, it is "this 'more' that must be made to appear and that must be described" (Foucault, 2016, p. 60).

This network of relations that is established between "discourses, institutions, architectural organizations, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral, philanthropic propositions," Foucault (1989, p. 138) called a device. A device, according to Foucault (1989), aims not only at constituting the subject, but at the constant increase of its usefulness.

The notion of subject expressed by M. Foucault, abandons the notion of "subject since always there" (Veiga-Neto, 2016, p. 107) and works to demonstrate in what ways this subject is constituted. For Foucault (2006), there is no subject preexistent to discourse, the subject is constituted historically and culturally in their time as discourses cross them. It is, therefore, a form that can be transformed, a form that is not always identical to itself.

Since the subject is immersed in the network of relations that is identified as device, its production does not occur outside power and knowledge relations. Thus, "the device always has a concrete strategic function and is always inscribed in a power relation" (Agamben, 2005, p. 10). For Foucault (1999; 2014), power does not stop, it is only exercised; it is everywhere as a network, a relation of forces that runs through subjects.

By mobilizing the Foucauldian perspective, the research falls within what is conventionally called post structuralism, and has the purpose of problematizing, analyzing, and deconstructing singular and contextual truths that circumscribe our object of study. However, this deconstruction should not be associated with destruction, but the possibility of dismantling and reassembling, of decomposing and recomposing what has already been said (Paradise, 2014). While not denying existing research procedures, poststructuralist researchers prefer not to be bound by them. Alluding to the metaphor of the wanderer, the researcher travels the research path without rigid principles, confronting various perspectives (Tedeschi & Pavan, 2017). Thus, we developed a theoretical essay, which is characterized by presenting a logical, rigorous, coherent, and critical argumentation on a given topic (Barbosa, 2018). Consistent with the post-structuralism perspective, our essay sought to problematize the discourses, generate discomforts, not restricting itself to instituting explanations and/or new theorizations on the topic.

In a theoretical essay, the researcher does not resort to an explicit methodological path, since it is a tacit one. Therefore, there is no prior delimitation of the corpus of literature,

DOI: 10.20396/zet.v29i00.8661833

as occurs in literature review and state-of-the-art studies, leaving it up to the researcher to mobilize the necessary bibliography to produce an argument. Supported by Fischer (2002, p. 43), the mobilized bibliography was analyzed "equally as practices that they are, as constitutors of subjects and bodies, of modes of existence not only of people but also of institutions and even of broader social formations.

In the following sections, we situate how the discourse of the specific Mathematics to teach has circulated in the scholars of Mathematics Education and, then, we discuss the network of relations that is established between this discourse and several elements that we name as device of Mathematics specificity.

Discourse of specific mathematics to teach

By going into the field of Foucauldian research, we try to make something more appear in the discourses that circulate in the investigations of Mathematics Education and that deal with a Mathematics that would be specific for teaching. These discourses have circulated in studies that adopt different conceptualizations on the subject. Liping Ma, for example, conceptualized the notion of Profound Understanding of Fundamental Mathematics (PUFM), requiring a teacher who not only knew the conceptual structure and basic attitudes of mathematics inherent in elementary mathematics, but who was also able to teach them to students (Ma, 1999).

Contemporary with Liping Ma's work, researcher Deborah Ball, along with her collaborators, develops the notion of Mathematical Knowledge for Teaching (MKT), a mathematical knowledge specific to teaching that would be different from the mathematical knowledge needed by other professionals such as an engineer, for example (Ball & Bass, 2003). These researchers, inspired by Lee Shulman's studies on the domain of teacher professional knowledge (Shulman, 1987), put effort into developing the notion of a teaching-specific mathematics and inspired many other studies in the field. To give an idea of the variability of these conceptualizations, we cite the work Neubrand (2018) in which the author discusses three of them: Mathematics for Teaching (MfT), Knowledge Quartet (KQ), and Structure Model (SM).

Given the diversity of conceptualizations, we turn our analysis on those that have shaped much of the research that deals with the topic in Brazil: Mathematical Knowledge for Teaching (MKT); o Mathematics Teachers' Specialized Knowledge (MTSK); and Mathematics for Teaching (MfT). Thus, we use the term "discourse of Mathematics specific to teaching" in an attempt to capture the discourse that contains MKT, MTSK, and MfT.

Researches carried out from the perspective of MKT take it as a theory that would be able to map the mathematical knowledge needed to perform the recurring tasks in mathematics teaching, especially after the study developed by Ball, Thames and Phelps (2008). In this study, the authors present a new categorization on Content Knowledge and

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Pedagogical Content Knowledge elaborated by Lee Shulman and identify subdomains for each of them widely disseminated in research in the area, both nationally and internationally (Ribeiro, 2012; Kim, 2016; Speer, King & Howell, 2015).

The search for this refinement has generated other study fronts from which we highlight the study of José Carrillo and collaborators who rework the domains of MKT by proposing that the knowledge of all teachers is specialized, configuring the notion of Mathematics Teachers' Specialized Knowledge (MTSK) (Carrillo, Climent, Contreras & Muñoz-Catalán, 2013). MTSK is also organized into domains and subdomains that would focus on demands related specifically to mathematics teaching. Along with this perspective, the group led by teacher Miguel Ribeiro has argued that the teaching practice of teachers of mathematics should be based on a broad and deep mathematical knowledge in order to guide students in the construction of knowledge from their own reasoning and production, valuing non-standard or incorrect processes as an opportunity for learning (Di Martino, Mellone & Ribeiro, 2019). In Brazil, MTSK has been widely disseminated by teacher Miguel Ribeiro from the perspective of the Specialized and Interpretive Knowledge of the teacher of/who teaches mathematics (Ribeiro, Mellone & Jakobsen, 2016; Ribeiro, Policastro, Almeida, Caldatto & Mellone, 2018).

Likewise, there are investigations that adopt a discursive perspective on the specific mathematics to teach arguing that knowledge about mathematics is inseparable from that established in teaching practice (Davis & Simmt, 2006). According to the authors, these investigations do not only aim at identifying what teachers know about mathematics, but also contribute to the production of new interpretative possibilities by proposing new ways of exploring it. They seek to point out what would be the complex nature of the phenomenon, avoiding to configure it through domains, which, for these researchers, would be reductionist attempts to describe it (Davis & Simmt, 2006; Davis & Renert, 2014). These studies believe they go beyond the analysis of teachers' mastery of mathematical content by focusing on how they discursively construct mathematical knowledge to teach (Barwell, 2013). These studies have been associated with the idea of MfT. For the authors, MfT is distributed in the collective of teachers, so that individual and collective knowledge cannot be dichotomized.

In the light of a Foucauldian perspective, we say that the variability of conceptualization about the discourse of the specific Mathematics to teach expresses the dispute to impose meanings about the teaching of Mathematics, which ends up constituting certain types of subject-teacher of Mathematics. Based on Grilo, Barbosa and Maknamara (2020), we consider that the subject-teacher of Mathematics is the subject "desired" by the discourse of specific Mathematics to teach, the one who has been subjectivized, who identifies or is identified by MKT, MTSK and MfT discourses.

Investigating how the constitution of this subject has been taking place, an "analytic of the subject" in the words of Veiga-Neto (2016), requires examining the discourses that surround and constitute him/her. According to M. Foucault, this production of the subject does not occur outside power relations.

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> Power, I think, must be analyzed as something that circulates, or rather as something that only works in chains. It is never located here or there, it is never in the hands of a few, it is never possessed as a wealth or a good. Power works. Power is exercised in a network, and in this network, not only do individuals circulate, but they are always in a position to be subjected to this power and also to exercise it. They are never the inert or consenting target of power, they are always its intermediaries. (Foucault, 1999, p. 35).

It follows, therefore, that the discourse of specific mathematics to teach puts power relations into operation to conduct the conduct of mathematics teachers, in the sense of being guided by others, but also to guide themselves. In the words of Foucault (2008, p. 255), "conduct is, in fact, the activity that consists in leading, driving, if you will, but it is also the way a person leads himself, the way he lets himself be led, the way he is led."

According to Foucault (1989), there is no truth outside of power relations; moreover, it produces and is produced by regulating effects of power. Thus, what exist are regimes of truth, that is, discourses that are accepted and come to function as true. Thus, the discourse of the specific Mathematics to teach seeks to print regimes of truth about how to view teachers' knowledge and, consequently, how to train them and how to teach Mathematics. According to Foucault (1989), there are mechanisms and instances enabled/recognized as capable of distinguishing and sanctioning true or false discourses; there are techniques and procedures valued for obtaining truth, such as the scientific method, for example; and there are those who have the function of saying what functions as true.

The investigations (Ball, Thames & Phelps, 2008; Tatto, 2013; Carrillo, Climent, Contreras & Muñoz-Catalán, 2013; Davis & Renert, 2014; Phelps & Howell, 2016; Ribeiro, Mellone & Jakobsen, 2016; Santos & Barbosa, 2016), and the scientific statements correlated to them, that circulate the discourse of the specific mathematics to teach are associated with research institutions, occur in architectural organizations (schools and universities) and are attentive to curricular legislations. Through scientific methods, with public or private funding, they seek to improve more and more their research tools to maintain their charge of saying what would be the "truth" about the specific Mathematics to teach. Thus, we say that the discourse of the specific Mathematics to teach, endowed with a strategic rationality, is engendered around a device that disposes the discourses in order to constitute the subject-teacher of Mathematics.

Mathematical specificity device

According to Agamben (2005), the device arranges a series of practices (discursive and non-discursive) and mechanisms (legal, technical, scientific, military) in order to face an urgency and to obtain an effect. Enabled by a heterogeneous group of elements, "a device arranges something in a peculiar organization, within a particular rationality" (Maknamara, 2011, p. 69). In the case of the device we named as device of mathematics specificity, among these elements we highlight: the discourse of the specific mathematics to teach, the research organizations and their scientific statements, the regulatory decisions (especially those

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referring to curricular guidelines) and the organizations involved (universities and schools). If every device "is a network whose composition works in favor of specific effects of power" (Maknamara, 2011, p. 129), we will say that this device has the purpose of leading the conduct of teachers of/to teach mathematics, in the sense of making them useful, qualified for good mathematics teaching.

To illustrate how these discourses approach good mathematics teaching, we will highlight excerpts from seminal studies on MKT, MTSK and MfT. First, the studies point out that training teachers of/to teach mathematics for good teaching involves unpacking mathematical knowledge, because they believe that presenting to students what is usually compressed in doing mathematics, can make this knowledge more accessible.

> (…) looking at teaching as mathematical work highlights some essential features of knowing mathematics for teaching. **One such feature is that mathematical knowledge needs to be unpacked. This may be a distinctive feature of knowledge for teaching.** Consider, in contrast, that a powerful characteristic of mathematics is its capacity to compress information into abstract and highly usable forms. (Ball & Bass, 2003, p. 11)
>
> **Teaching involves the use of decompressed mathematical knowledge** that might be taught directly to students as they develop understanding. (Ball, Thames & Phelps, 2008, p. 400)

These speeches point out that good teaching in mathematics is not only about unpacking mathematical knowledge, but also requires that teachers develop the ability to articulate different areas of mathematics, as well as different levels of knowledge.

> **Another important aspect of knowledge for teaching is its connectedness**, both across mathematical domains at a given level, and across time as mathematical ideas develop and extend. **Teaching requires teachers to help students connect ideas they are learning—geometry to arithmetic, for example**. (Ball & Bass, 2003, p. 11)
>
> **Teaching also requires teachers to anticipate how mathematical ideas change and grow.** Teachers need to have their eye on students' "mathematical horizons" even as they unpack the details of the ideas in focus at the moment (Ball, 1993). **For example, second grade teachers may need to be aware of the fact that saying, "You can't subtract a larger number from a smaller one", is to say something that, although pragmatic when teaching whole number subtraction, is soon to be false.** (Ball & Bass, 2003, p. 12)

Besides this articulation, it is also expected that teachers manage their classes well. This management involves knowing how to choose the best strategies to present mathematical knowledge, the forms of articulation between questions and answers, between advancing or postponing the presentation of a new content, for example.

> During a classroom discussion, **a teacher must decide when to pause for more clarification, when to use a student's remark to make a mathematical point, and when to ask a new question or pose a new task to further students' learning.** Each of these decisions requires coordination between the mathematics at stake and the instructional options and purposes at play. (Ball, Thames & Phelps, 2008, p. 401)

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It is not expected, however, that these abilities are dissociated from an understanding of different ways of doing mathematics. In this sense, the mathematics teacher is required to have the ability to interpret different methods and solutions presented to problems.

> **Knowing mathematics for teaching often entails making sense of methods and solutions different from one's own**, and so learning to size up other methods, determine their adequacy, and compare them, is an essential mathematical skill for teaching, and opportunities to engage in such analytic and comparative work is likely to be useful for teachers. (Ball & Bass, 2003, p. 13)
>
> Significant to this example is that a teacher's own ability to solve a mathematical problem of multiplication (35 x 25) is not sufficient to solve the mathematical problem of teaching **- to inspect alternative methods, examine their mathematical structure and principles, and to judge whether or not they can be generalized**. (Ball & Bass, 2003, p. 7).

The ability to understand non-standard methods of solving a problem gains power in these speeches when they highlight that it is also up to the teacher the ability to interpret incorrect methods performed by the students.

> **Recognizing that this student's answer as wrong is one step, to be sure. But effective teaching also entails analyzing the source of the error**. (Ball & Bass, 2003, p. 17)
>
> However, **teaching involves more than identifying an incorrect answer**. **Skillful teaching requires being able to size up the source of a mathematical error.** Moreover, this is work that teachers must do rapidly, often on the fly, because in a classroom, students cannot wait as a teacher puzzles over the mathematics himself. (Ball, Thames & Phelps, 2008, p. 397)
>
> This interpretative knowledge, being part of mathematical knowledge, **is defined as the knowledge that allows teachers to give sense to pupils' non-standard answers** (i.e., adequate answers that differ from the ones teachers would give or expect) **or to answers containing errors**. (Ribeiro, Mellone & Jakobsen, 2016, p. 9)

For these discourses, these and other capacities required from the teacher who teaches mathematics do not occur outside a given context. In this sense, the mathematical knowledge mobilized by teachers should take into account the social and interactional context in which it is developed.

> (…) since human interaction is fundamentally discursive, **any accounts of knowing, meaning, intending and so on are inevitably shaped by the immediate temporal, social and interactional context in which they arise**. (Barwell, 2013, p. 600)
>
> Because of its dynamic and nested character, mathematics-for-teaching cannot be considered a domain of knowledge to be mastered by individuals. **It always occurs in contexts that involve others – and, hence, an awareness of how others might be engaged in productive collectivity is an important aspect.** It is thus that our research into teacher's mathematics-for-teaching is oriented by an assumption that we also take into our teaching of mathematics: The 'learning system' that the teacher can most directly influence is not the individual student, but the classroom collective (Davis and Simmt, 2003). (Davis & Simmt, 2006, p. 309)

In view of the above, we understand that the device of mathematics specificity is

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another kind of pedagogical device, that is, a device that "takes care of the learning calculated of the desired effects within a rationality (...) that teaches individuals to become subjects endowed with what power wants" (Maknamara, 2020, p. 144). The device of mathematical specificity has the training of teachers who teach mathematics as a privileged field of actualization, and its main thrust is the defense that there would be a specific mathematical knowledge to teach. According to Deleuze (1996), the line of force passes through all places of a device, often invisible and unspeakable, but closely entangled in other lines and totally unravelable. The discourses of the MKT, the MTSK, and the MfT are lines that are also entangled in this network that, in the midst of power and knowledge relations, favor the appearance of new modes of subjectivation.

In this sense, Agamben (2005, p. 13) says that the subject is what "results from the relationship and, so to speak, from the body-to-body between the living and the devices. By looking at the productivity arising from the network of relations that is established among these elements, we turn to the modes of subjectivation, the types of subject-teacher of Mathematics, demanded and constituted piece by piece by this device. Corroborating Agamben (2005), in a previous study, we argued that the discourse of teaching-specific mathematics has been aimed at producing subjects who should be able to: unpack, connect, articulate, anticipate, understand, and prove mathematical ideas in order to make them more accessible to students, so they are also expected to be participatory subjects engaged in collective situations in which they can discuss and, consequently, increase or reconfigure their conceptual repertoire. They are subjects controlled by the context in which they are inserted, cognizant of curriculum guides, explorers of opportunities and (re)formulators of mathematical concepts (Grilo; Barbosa; Maknamara, 2020).

Deleuze (1996) states that in the network that entangles the heterogeneous elements that constitute the device, knowledge, power and subjectivity do not present defined contours, they are vectors or tensors that will allow the emergence of new lines in the device. However, before trying to identify what these new lines are, we will try to problematize those that emerge related to the dimension of power relations.

To illustrate how the discourse of the specific Mathematics to teach mobilizes different power relations, we initially highlight how it operates with sovereign power, presenting excerpts of studies that circulate the discourses of MKT, MTSK and MfT. In another study, Grilo and Barbosa (2021) present a more in-depth analysis on how the discourse of Mathematics specific to teaching mobilizes power relations to conduct the conduct of teachers.

> We hypothesized that **teachers' opportunities to learn mathematics for teaching could be better tuned if we could identify those types [of knowledge] more clearly**. If mathematical knowledge required for teaching is indeed multidimensional, then **professional education could be organized to help teachers learn the range of knowledge and skill they need in focused ways**. **If, however, the mathematical knowledge required for teaching is basically the same as general mathematical ability, then discriminating professional learning opportunities would be unnecessary.** Based on our analysis of the mathematical demands of teaching, **we**

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> **hypothesized that Shulman's content knowledge could be subdivided into CCK and specialized content knowledge and his pedagogical content knowledge could be divided into knowledge of content and students and knowledge of content and teaching.** (Ball, Thames & Phelps, 2008, p. 399)
>
> In contrast, **MTSK**, by virtue of being designed to encapsulate teacher's specialized Knowledge, **focuses its attention on mathematical content and, with greater precision, on the different ways of fully engaging with mathematical content when teaching**. (Carrillo, Climent, Contreras & Muñoz-Catalán, 2013)

It can be seen that sovereign power shows itself through the discourse of specific mathematics to teach when it advocates for itself the sovereignty of a specific field of knowledge, which the studies developed by Shulman (1987) were not able to detect. This knowledge takes the place of the sovereign, who, in order to defend himself or his territory (the practices of mathematics teaching), has the right over the life and death of his subjects (mathematics teachers). This right is exercised by "making die" teaching practices based on a Mathematics that is not specific to teaching, allowing "letting live" a teaching practice that accounts for such specificities.

To this sovereign power is nested a pastoral power that intends to guide its flock (the set of teachers who teach mathematics) to salvation, leading them to move between different domains of knowledge, as proposed by Ball, Thames & Phelps (2008) (Figure 1) and Carrillo, Climent, Contreras & Muñoz-Catalán (2013) (Figure 2) or different conceptual emphases as proposed by Davis & Renert (2014) (Figure 3).

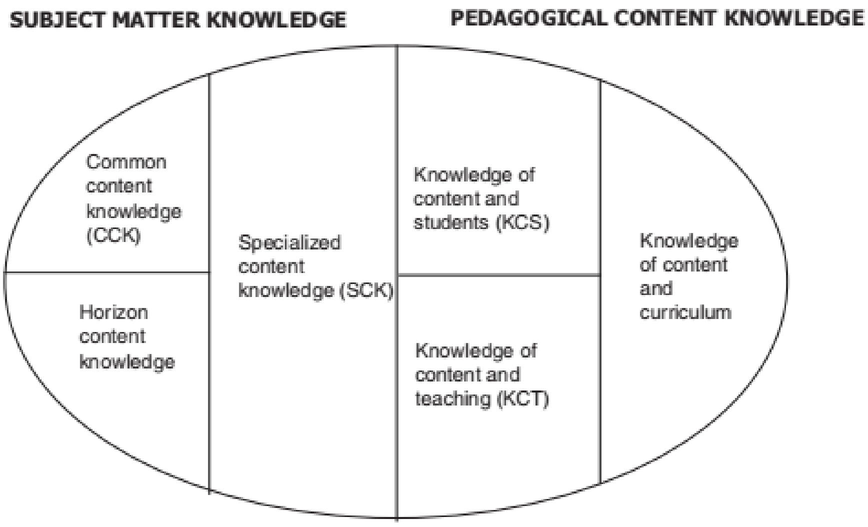

Figure 1. Domains of Mathematical Knowledge for Teaching
Source: Ball, Thames & Phelps (2008, p. 403)

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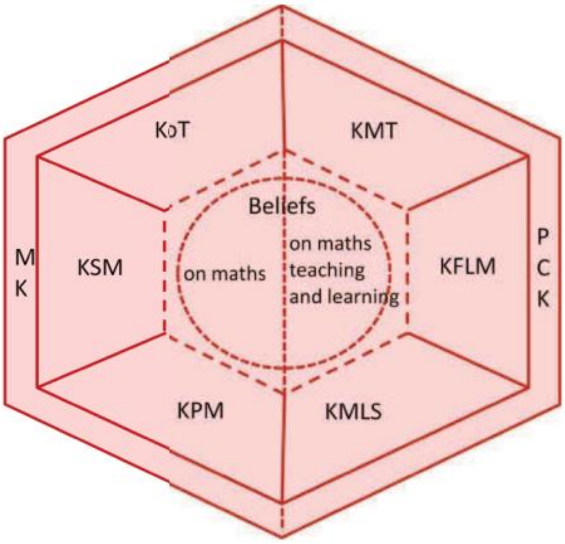

Figure 2: Mathematics Teacher Expertise Chart
Source: Carrillo, Climent, Contreras & Muñoz-Catalán (2013, p. 2989)

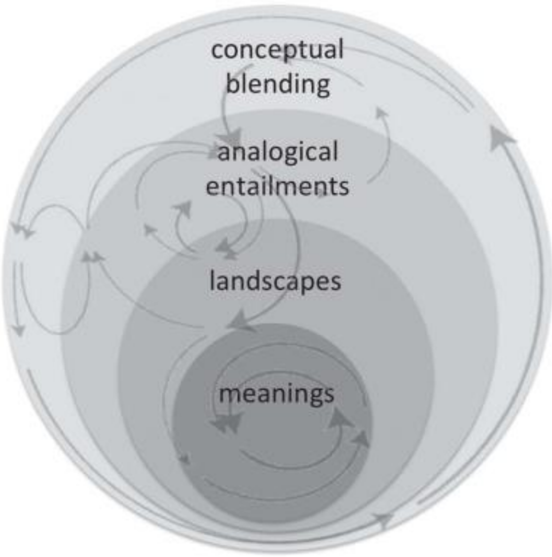

Figure 3. A visual metaphor to describe the relationships between concept study emphases
Source: Davis & Renert (2014, p. 57)

The monitoring of this transition between domains and conceptual emphases occurs through the scrutiny of the collective of teachers who teach mathematics performed by the operation of a disciplinary power. Disciplinary power "takes individuals both as objects and as instruments of its exercise" (Foucault, 2014, p. 167). Thus, teachers are examined, as well as acting as an instrument that examines the mathematical practices of their students. Examination "is a normalizing control, a surveillance that makes it possible to qualify, classify, and punish" (Foucault, 2014, p. 181).

Projects such as the Learning Mathematics for Teaching Project (LMT) (http://www.umich.edu/~lmtweb/) and the Teacher Education and Development Study in Mathematics (TEDS-M) (Tatoo, 2013) use the exam technique by designing, applying, and

DOI: 10.20396/zet.v29i00.8661833

refining assessment instruments applied on a large scale. These projects aim, among other purposes: a thorough control of the structure of teachers' mathematical knowledge (Ní Ríordáin, Paolucci & O'Dwyer, 2017); relate them to students' mathematical performance (Delaney, 2012; Tchoshanov, 2011), refine assessment instruments (Phelps, Kelcy, Jones & Liu, 2016). Allied to this, we see growing in the area the development of continuing education courses for teachers that aim to examine their practices around the knowledge mobilized when teaching (Rangel, Giraldo & Maculan Filho, 2015; Di Bernardo; Policastro; Almeida; Ribeiro; Melo & Aiub, 2018), of how they interpret their students' productions (Couto; Ribeiro, 2017; Ribeiro, 2017), of how they mobilize different representations of a given mathematical concept (Menduni-Bortoloti & Barbosa, 2018; Santos; Barbosa, 2016).

Acting articulately and mutually on multiple bodies, these powers become even more insidious when intending to govern the lives of the set of mathematics teachers when bio power comes into play. Bio power, different from sovereign power and disciplinary power (but not separate from them), is not exercised over a body, but over a multiple body - the population (here understood as the group of mathematics teachers) - through regulations that seek to govern life (Foucault, 1989). It is not difficult to find among the studies on MKT, MTSK and MfT generalizing indications for public policies on teacher education that aim to promote a government of life and even on implications of mathematical knowledge for the development of a country, as seen below.

> **Curricular implementations are unlikely to deliver the anticipated benefits for mathematics learners if written guidance to teachers is interpreted and enacted differently from the ways that policymakers and curriculum designers intend**. (Foster & Inglis, 2017, p. 2)
>
> **In the new economy**, mathematics has emerged as the gateway discipline (…). Yet the **sorts of mathematical competence that are of value to current and future society bear ever-diminishing resemblance to the emphases seen in contemporary classrooms**.
> (…) **but in spite of large-scale initiatives to rethink the content of school mathematics** (e.g., NCTM, 1989, 2000), so far, **few educational institutions have demonstrated a capacity to match the pace of cultural change**. (…) the fundamental content has changed very little from previous decades and even centuries. Many reasons can be (and have been) mentioned: social inertia, limited resourcing of schools, fatigue with ever-swinging reform pendula, systemic resistance to reform, and so on. **We believe that a critical (if not the main) issue here is a lack of capacity in teachers to deal with new mathematical content, and even with current content, in compelling ways**. In other words, the stagnation has much to do with teachers' disciplinary knowledge of mathematics.
> (…)
> Schools have traditionally emphasized the development of technical competence, which was an obvious need in an industrial economy. **But in a knowledge-based economy, the development of conceptual fluency is of greater importance and has been the focus of major initiatives in school mathematics.** Our research into the subtlety and complexity of teachers' knowledge not only reveals that some major shortcomings of these initiatives, it also offers an important possible route to achieving the goal of true conceptual fluency – a profound understanding of emergent mathematics. (Davis & Renert, 2014, p. 13-127).

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As if we could put a magnifying glass over the lines that are interwoven in the device of mathematics specificity and, even if for a second, we could capture it, we built a network[4] (Figure 4) that interweaves the relations of power and knowledge and what is demanded to the subjects that teach mathematics so that they are recognized and can recognize themselves as "good teachers" of mathematics. For this, we look at what is demanded to mathematics teachers by the discourse of the specific mathematics to teach as a "point" in the network that configures, in a given historical moment, the device of mathematics specificity, since they define the condition that is possible to be occupied by the subject-teacher of Mathematics.

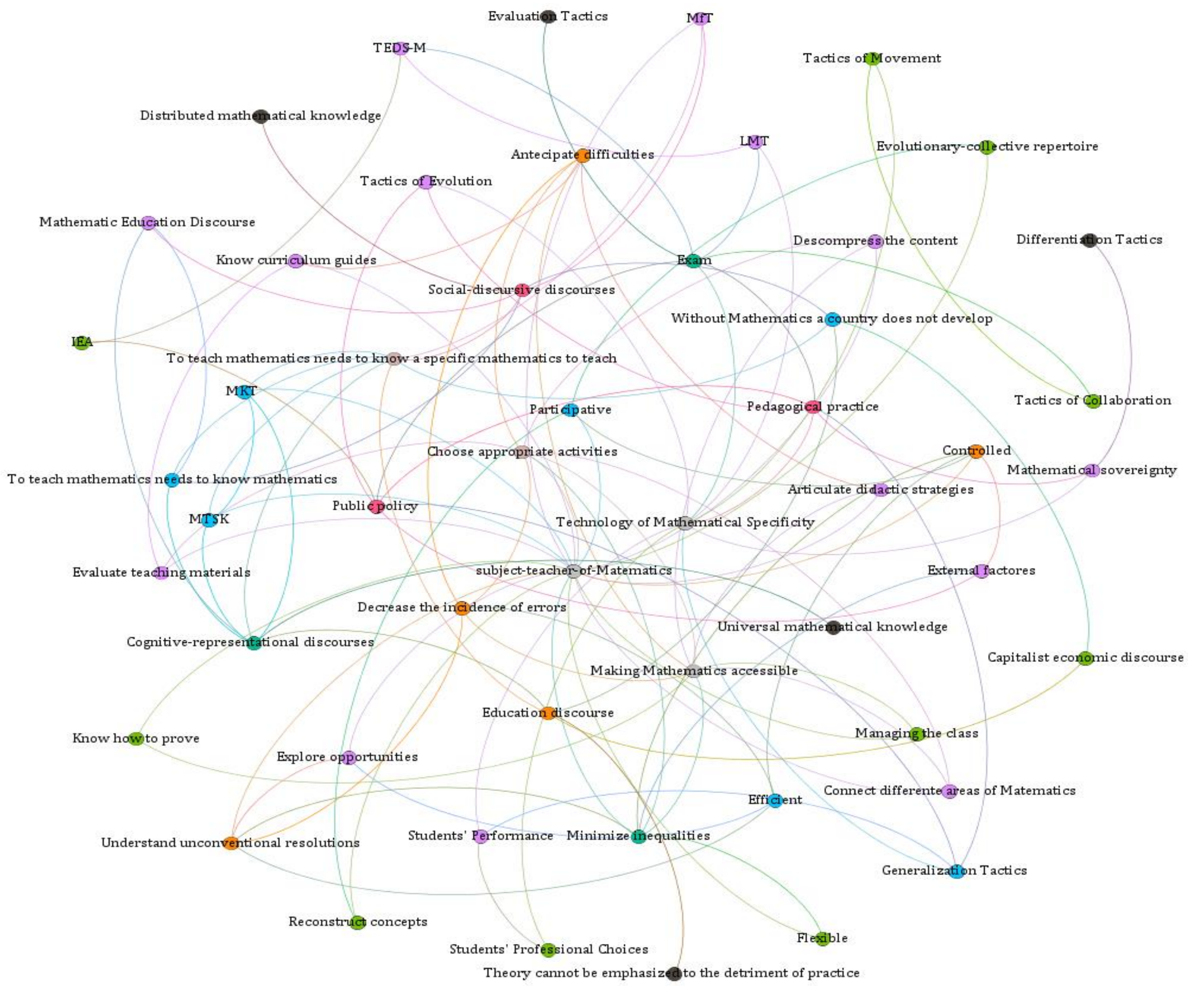

Figure 4: The relations of power and knowledge and what is demanded from the subject-teacher of Mathematics

Source: The authors

The device of Mathematics specificity operates to make teachers who teach Mathematics increasingly visible, entangling knowledge and power. As Foucault (1999) taught us, we look at how power works and, by capturing its operation, we describe the network that entangles, interlaces, and articulates it; the network that makes it capillary, transitory, pulverized, and decentered. In the description of this network, the subject-teacher of Mathematics is in a position to be submitted to this power, but also to exercise it, since

[4] Gephi software was used to build the network.

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"the individual is an effect of power and is, at the same time, to the same extent that it is an effect of power, its intermediary: power passes through the individual that it has constituted" (Foucault, 1999, p. 35). Among so many lines momentarily captured, we saw that the subject demanded by the discourse of the specific mathematics to teach concurs to "Make mathematics accessible to students", "Decrease the incidence of errors" and "Identify the external (or internal) factors that influence the (non)learning of mathematics".

Final considerations

We understand the device of mathematics specificity as the network of power relations that entangle different fields of knowledge (Mathematics, Pedagogy, Economics) in order to inform ways of being a useful mathematics teacher for the development of the country. We take power as a productive instance, a producer of subjectivities. In this way, when we turn to the network that shows the relations of power and knowledge and the modes of subjectivation of the mathematics teacher, we do not seek to display a general law or structure that reveals how these relations are exercised, we seek to represent how complex these relations are.

Involved in this complexity represented by the network, the power and knowledge relations favor the appearance of new modes of subjectivation, given the discursive proliferation that they provide. We have seen, for example, that this discursive web demands a subject-teacher of Mathematics who: makes Mathematics accessible to students; reduces the incidence of student errors; is attentive to factors outside pedagogical practice; is responsible for student performance on standardized tests; is responsible for his/her professional choices; submits to the exam, as an instrument that scrutinizes pedagogical practice to provide information to Public Policies; articulates theory and practice; and promotes the development of his/her country. These new modes of subjectivation appear, especially, when we focus the analysis on the discourse of the specific mathematics to teach and we see it unfolding in discursive interweavings that are not restricted only to the field of Mathematics Education, finding "points" in the field of educational and economic discourses.

The subject-teacher of Mathematics occupies a prominent place in the network, not because he/she is the center (there is no centrality), but because he/she is both an emitter and a receiver of power. This subject, as a position that can be occupied, results from a discursive construction that takes place within regimes of truth that are established in relation to time and space. Since these regimes of truth are not fixed, what we present in this essay is a dated construction, proper of the time in which it was written, and loaded with what positions us as subject-teachers. This construction points out that the discourse of the specific mathematics to teach aims to conform the sovereignty of mathematics as a knowledge that has its own regimes of truth and that advocates for itself a discursive practice already formalized, as a "model for most scientific discourses in their effort to achieve formal rigor and demonstratively" (Foucault, 2016, p. 228).

In reaffirming this sovereignty, the discourse of specific Mathematics to teach denies

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the possibility of other Mathematics entering the school environment. In this regard, we did not identify in the teaching-specific mathematics discourse any conceptual domains or emphases that dealt with non-school mathematics. Nor did we identify that adaptations of test items made available by the Learning Mathematics for Teaching (LMT) project (Know, Thames & Pang, 2012), occurred for the recognition of other Mathematics. Likewise, they deny the possibility of mathematics losing its sovereignty over other school knowledge, given that when domains and emphases try to connect different areas or perform conceptual combinations, they problematize areas of mathematics itself (for example, Arithmetic, Algebra, and Geometry) and do not discuss ways to approach it in an interdisciplinary way. Because it is considered sovereign, Mathematics alone is enough!

However, this statement does not say that this discourse remains indifferent to the contexts that surround it. Let us remember the study of Hoover, Mosvold, Ball & Lai (2016), when the authors point out that the area has begun to address the persistent inequality of mathematical learning produced and reproduced in schools. However, when looking at the discursive weave represented by the network, we ask whether this interest of the area aims to break with the sovereignty of Mathematics, giving way to other Mathematics and other fields of knowledge; or aims to meet an economic-capitalist discourse for which, among other things, a country needs Mathematics to develop?

For now, the discursive interweavings that appear on the web show us that the subject position that says of the need for teachers to make Mathematics accessible to students, is intertwined with other discourses that perform a thorough examination of the pedagogical practices in which they participate, in order to provide subsidies to educational public policies. Educational public policy, according to Stephen Ball, is increasingly related to business, social enterprise, and philanthropy in the provision of education services, which intertwine to "make the 'market' the obvious solution to social and economic problems" (Ball, 2014, p. 59). This leads us to conjecture that the relations of power and knowledge have led to the manufacture of the subject-teacher of Mathematics in accordance with the maintenance, not only of the sovereignty of this knowledge, but of the interest of the economic-capitalist discourse.

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