
Product and Agent: Two Faces of the Mathematics Teacher

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In this paper we will explore how the “mathematics teacher” becomes a subject and, at the same time, is subjected as part of diverse dispositives of power. We argue that the mathematics teacher becomes both a product and a social agent, which has been set, within current societies, from the ideas of globalization, social progress, and competitive logic. For our approximation, we use the concepts societies of control, dispositive, and discourses from a Foucault–Deleuze toolbox. Our purpose is to cast light on the social and cultural constitution of the ways of thinking about the mathematics teacher. Hence, our critical examination offers understandings about how mathematics teachers are part of the larger cultural politics of schooling and education.

Introduction

Mathematics teachers are important. Or so it is said repetitively in different spheres of society, as well as in mathematics education research. Moreover, mathematical knowledge is considered as an important knowledge for society and its development, since this knowledge is providing tools and skills that help the subject to confront diverse tasks and problems of everyday life and of his/her context. Therefore, mathematics teachers become the ambassadors of mathematics and the ones that bring such knowledge to the new generations. To think mathematically is seen as a powerful means to understand and control one’s social and physical reality. The mastery of mathematical knowledge and the possession of mathematical competencies are primordial characteristics of the rational, objective, and universal subject embodied in notions of the cosmopolitan modern citizen (Valero & García, 2014). Mathematics teachers fulfil the Promethean task of bringing light to children for the benefit and progress of humanity.

By studying the diverse discourses that circulate about the mathematics teacher, we can see a centrality in teaching the “right”

mathematics and in mathematical knowledge. Diverse enunciations are formulated within trends and interest of society, configuring particular forms of understanding teaching, the teacher, and mathematical knowledge, which leads to shaping a way of reasoning about the mathematics teacher. The mathematics teacher is being constantly (re)formed under such ideas as progress, development, and justice. *Cultural theses* (Popkewitz, 2009) about the mathematics teacher are configured and together with the network of practice of mathematics education (Valero, 2010), are shaping certain possible conditions that allow the generation of the desired subject.

The “mathematics teacher” that we are talking about here is not as such any concrete individual of flesh and bone. It is a discursive construction where power gets actualized in articulating ways of thinking about a desired being. But saying that the “mathematics teacher is not a concrete person” does not mean that we are talking about theoretical constructions that have nothing to do with real people. On the contrary, as we have argued before (Valero, 2009), the forms of thinking about the practices of mathematics education that emerge from, and in, such discourses configure and set frameworks that lead individuals towards the subject they should become or “must be”. Understanding the mathematics teacher—as subject—, cultural theses and discourses is an important task for research that takes a critical stance towards the established truths of society. Without that critical stance it is difficult to imagine new possibilities for practice.

In this paper, we engage in a critical study of the cultural thesis about the mathematics teacher that navigates in research and in public discourses. While in recent research there have been studies advancing a political reading of mathematics education practices (Gates & Jorgensen, 2009), there are few studies that turn the gaze towards the mathematics teacher. In this paper we bring into operation some tools from the theoretical toolbox of Foucault (1971, 1972, 1980) and Deleuze (1986, 1992a, 1992b) to explore how the mathematics teacher becomes a subject and, at the same time, is subjected as part of dispositives of power. It is our contention that there is a dominant educational logic whereby the teacher is constructed as the professional that responsibly provides answers to the social demands of our times. Such logic effectively inserts the mathematics teacher in the calculations of power in a double sense. The teacher becomes a desired product of society, a highly valued merchandise whose value

is the possession and possibility of transmitting mathematical knowledge. Simultaneously he/she becomes an agent who should be able to conduct children towards the desired knowledge of mathematics, a highly qualified sales person of the mathematical merchandise.

Analytical Strategy

We seek to think the mathematics teacher as a historical-cultural construction, situated in a particular spatio-temporal configuration, wherein the mathematics teacher is a subject immersed in discursive practices. By studying the discourses that circulate in the research and the discourses that are formulated for international agencies, Valero (2014) argues that the research in mathematics education creates the languages for naming study objects and ways of thinking about these objects.

In a Foucaultian approach, discourses are not understood in terms of “a particular instance of language use—a piece of text, an utterance or linguistic performance—but describing rules, divisions, and systems of a particular body of knowledge” (Arribas-Ayllon & Walkerdine, 2008, p. 99). Rather, discourses are generated in spatio-temporal configurations. Furthermore, discourses are not statements by well-respected authors. Rather, it is the repetition of enunciations in certain conditions of possibility that allows the generation of truths and the constitution of forms of reasoning. Hence, a Foucault-inspired discourse analysis seeks the regularities and systematicity that lead to discursive formations, where these statements form a rhizomatic field leading the desired subjects of mathematics education. The role of the analyst is to reveal the convergence of a complex network of discursive practices.

In the case of this investigation, our strategy also deploys some concepts from the theoretical toolboxes of Foucault (1971, 1972, 1980) and Deleuze (1986, 1992a, 1992b), our focus being mainly on societies of control, dispositive and discourses. These concepts allow us to weave together the statements, their conditions of possibility, and their effects.

Specifically, our empirical material is the recent research produced about mathematics teachers published in a volume of “Journal of Mathematics Teacher Education” (JMTE, 2014), and some recent

official documents of international agencies published by OECD (2012, 2014) and UNESCO (2009). In this material, enunciations that express the characteristics of the “desired” mathematics teacher were selected and examined to identify the discursive object that we call “the mathematics teacher”, and from there some statements about that desired subject were identified as the truths on that ideal subject. But those statements were also seen in relation to other enunciations that talk about the conditions and demands of such desired subject in particular spatio-temporal configurations. The notions of societies of control, dispositive, and discourses allowed us to build a rhizomatic web of enunciations leading us to formulate the statements about the mathematics teacher, allowing us to evidence the forms of reasoning that currently constitute notions of the “mathematics teacher”.

Societies of Control, Dispositives and Discourses in the Making of the Desired Mathematics Teacher

Societies of control (Deleuze, 1992b), dispositive (Deleuze, 1992a; Foucault, 1972), and discourses (Deleuze, 1986; Foucault, 1971, 1972, 1980) are entangled to promote an understanding about the fabrication of subjectivity and how certain conditions of possibility are configured to shape the subject: the “mathematics teacher”. The research and the international agencies are promoting enunciations and statements—discourses—around an ideal image of the mathematics teacher. The discursive formations respond to particular requirements and demands of spatio-temporal conditions. This ideal image of the mathematics teacher is transformed into the “must be” of the teacher, a desired subject, producing regimes of truth, power relations, which normalize forms of thinking about concrete teachers.

Moreover, discourses have provided and contributed to establish a certain regime of truth and regime of power, in which are circulating ideas that are shaping how we are understanding the diverse issues about the mathematics teacher. In these regimes, some ideas are repeated over and over, some ideas are unquestioned and these ideas do not appear to generate resistances. For example, ideas such as permanent training and lifelong learning currently are considered as natural and innocent, but these ideas are promoting a continuous

redefinition of the teacher from constant evaluations. For example, in the research we can find a statement such as:

Many PPTs (prospective primary teachers) wanted to continue taking another mathematics course because they wanted to improve their mathematics knowledge and skills not only for themselves but also for the sake of their future students. (JMTE, 2014, p. 356)

This kind of statement shows how in many mathematics teachers there emerge a need and an interest in upgrading his/her teaching knowledge and tools—either through specialization or continuing studies—to respond to the challenges. But, why did the need of permanent training and lifelong learning emerge and what is being sought with it? We can find a partial answer in what Deleuze (1992b) argues:

... in the societies of control one is never finished with anything—the corporation, the educational system, the armed services being metastable states coexisting in one and the same modulation, like a universal system of deformation (Deleuze, 1992b, p. 4)

Therefore, we could understand that the idea of permanent training and lifelong learning is responding to the rationality provided by societies of control. Moreover, societies of control have facilitated the conditions to replace the factory by the corporation, the examination by continuous control, and where the school tends to be replaced by perpetual training (Deleuze, 1992b). Consequently, within societies of control, the process of making all society production, of defining it, of doing it or of creating it is never finished. Therefore, this process is involved in a constant state of becoming. This has led to set truths and discourses that respond to different interest, ideas, and rationalities.

There emerge dispositives and discourses around the mathematics teacher which allow us to think of him/her in terms of development (JMTE, 2014, pp. 1, 86, 180, 303, 380, 405; OECD, 2012, 2014), skills (JMTE, 2014, pp. 15, 87, 110, 284, 337), knowledge (JMTE, 2014, pp. 5, 41, 101, 373, 420), and performance (JMTE, 2014, pp. 66, 150, 202, 240, 299, 409) and where the mathematics teacher is constantly measured

and evaluated (JMTE, 2014, pp. 106, 465; OECD, 2012). In the discourses that circulate, it is possible to see increased attention on the mathematics teacher's knowledge—mathematical knowledge, pedagogical knowledge, among others. For example, it is not difficult to find statements in the diverse discourse that circulate, such as:

[teachers need to] develop professional knowledge in support of their practice (JMTE, 2014, p. 455)

[T]he teachers' knowledge of functional thinking was below the level expected for teaching middle-school algebra. This provides further evidence of teachers' inadequate understanding of mathematics for teaching (JMTE, 2014, p. 418)

The dispositive is formed as response to an urgent need—"urgency"—(Foucault, 1980) of society and social change. The dispositive defines the space of allowed and prohibited movements. Therefore, dispositives are articulating the network to think, to enunciate, and subjectify the mathematics teacher. Dispositives are promoting diverse statements and enunciations about the mathematics teacher; by creating an image of the desired mathematics teacher and his/her "must be", the dispositive is leading and configuring conditions that favor certain practices and knowledge. In other words, the mathematics teacher is subjected to dispositives and discourses and she/he becomes the product of the predominant system of reason.

Dispositives are shaping discourses. Discourses are composed of enunciations and statements (Foucault, 1972), wherein the regularity in the use of certain statements is prompting to certain discourses that are accepted as true and naturalised, therefore these discourses are not questioned and are accepted without resistance. These are showing ways of knowing and are expressing: a desired vision about the diverse subjects involved in education; the role of mathematics education in building a better world; and some truths established in the diverse practices on teaching and learning of school mathematics (Valero & García, 2014), which are configured within regimens of power and truth.

Foucault (1971, 1980) proposed that there are not inert discourses and an all-powerful subject that is manipulating or is setting it, rather, the subjects are part of a discursive field with a specific position and

role. The discursive practices are based in social concerns and social interest and these react to social changes, urgencies, and contingencies.

It is stated that it is urgent that the mathematics teacher has a variety of skills and knowledge, to respond to main urgencies of society, which it will lead to diverse discourses and games of power, in pursuit of the development of a modern society more just and equal. UNESCO (2009) proposed that mathematics teaching should be organized for the development of a conception of mathematics as a tool to understand and change the world, and also as a field of knowledge with objects, rules, and foundations. In this scenario, there emerge tendencies, demands and requirements that the mathematics teacher must face. Changes in the demand for skills and ability have profound implications for the competencies which teachers themselves need to develop, since they will need to acquire tools to effectively teach the 21st century skills that the students need (OECD, 2012):

The kind of education needed today requires teachers to be high-level knowledge workers who constantly advance their own professional knowledge as well as that of their profession. Teachers need to be agents of innovation [...] [Thus, they] can help to improve learning outcomes and prepare students for the rapidly changing demands of the 21st-century labor market (OECD, 2012, p. 36)

Teacher's Permanent Training and Lifelong Learning as Dispositive in Societies of Control

For example, OECD (2012) pointed out that school leaders reported a lack of qualified mathematics and science teachers. In many countries there is a high demand for qualified mathematics teachers, namely, teachers well-trained to the highest standards of professional knowledge, skills, efficiency, competence, and integrity, who can lead and implement diverse initiatives to improve teaching.

We can see that within diverse places a discussion about educational coverage and high quality education has been started and established. Here emerge at least two issues. Firstly, the increasing

demands for professionally qualified teachers and at the same time the lack of mathematics teachers. There is a strong logic of competition between teachers. Teachers need to compete not only in qualifications with others to get a job, but also the teacher must compete with him/herself. By this, teachers are able to show they have the skills and knowledge that are demanded. Secondly, there is a centration on the knowledge and skills of the mathematics teacher for mathematics teaching. Accordingly, this teaching must satisfy established standards of quality, in other words, fulfill the expectations that led to set the need for permanent training and lifelong learning.

The idea of permanent training and lifelong learning is operating as a dispositive, in term of Foucault (1980) and Deleuze (1992a), in other words, these are operating as “an ensemble (set) of strategies of relations of force which condition certain types of knowledge and is conditioned by them” (Bussolini, 2010, p. 92) by setting forms of control, discourses, and forces.

Currently, we can see that the highest mechanism of control in the education system is the use of standardized tests, where the mathematics teacher has a great importance, mathematical knowledge is appreciated by the society, and the teacher is responsible for its teaching. Modern society needed mathematics to establish its foundation on reason and logic. These standardized tests are setting a numerical language of control that marks access to information, and where people have become samples, data, or markets (Deleuze, 1992b), by configuring everything around a marketing logic:

Marketing has become the center or the “soul” of the corporation [...] the operation of markets is now the instrument of social control and forms the impudent breed of our masters. Control is short-term and [...] continuous and without limit, while discipline was of long duration (Deleuze, 1992b, p. 6)

In discourses that circulate, we can find how the education system is demanding “good mathematics teachers”. The good mathematics teacher is defined from the rationality and desires prevailing in a society, which is setting the parameters and ideas, with which is measured and evaluated the teaching work, and that lead to a desired image to which all teachers should aspire. Currently, for example, statements are favoring the establishment of discourses about the mathematics

teacher such as: teachers should have the knowledge (mathematical, pedagogical, didactic, among others) to perform successfully their work, developing fully the student potential; teachers “must be” able to adjust to the requirements and standards established at national and international levels; and teachers should be upgraded constantly and should be in permanent training and lifelong learning.

The “must be” of the teacher is setting diverse dispositives that are excluding all feared and undesired features for a globalized society. Therefore, discourses are promoting a form to conceive, to understand, and to think about the mathematics teacher. The majorities of these discourses are formulated and are sustained in ideas of modern society, for example, globalization, equity, and access to knowledge. For example, permanent training and lifelong learning is leading to particular discourses, where the ongoing evaluation is used as a way to control and is giving the tools to understand if a teacher is “good” or meets the demands.

Moreover, the current education system has been favoring a standardization of mathematics teachers, in others words, the fabrication of a standard subject, which has emerged as a response to social demands and urgencies, for instance, educational equity, where everyone must have access to a equitable education. This standard subject must be able to respond to diverse contexts and realities from a standardized education. Here we can see a paradox because the mathematics teacher will be educated with skills and knowledge that is responding to a ideal context, namely a context very different to the real context. Furthermore, the international standard about the competencies and skills that a student should develop in the school are promoting diverse demands and many of these are focused on the mathematics teacher, in his/her knowledge, skills, and practices.

The emergence of demands, from diverse places, has favored the establishment of a direct relationship between the development of the mathematics teacher and requirements established by the system. Because society needs that the mathematics teacher be able to respond to requirements and to desires. Moreover, professional development and teachers educations are configured in particular epistemologies and practices, responding to the “urgencies” and the dominant rationality of determined spatio-temporal conditions. Currently we can see how such ideas as globalization, equity, and access to knowledge have been promoting different ways of doing, of thinking and of

acting, constituting, in the words of Foucault (1980), diverse dispositive and technologies that favor certain truths and subjectivities. But with these ideas (globalization, equity, and access to knowledge), what kinds of mathematics teachers are requested by society through the diverse demands?

Inside a marketing model that is around the mathematics teacher, mathematical knowledge takes great importance, since the mathematics is a precious resource for the society because its development is strongly related to the development of the society and social welfare; moreover, it favors establishing a rationality and the fabrication of the rational, logical, and modern subject that society wants.

Conclusion

Mathematics education has been considered of great importance to ensure social development, but this has led to using mathematics with diverse intentions. For example, to select, to qualify, to segment, to decide, and so on. The mathematics teacher becomes a product of social demands, depending on interests, ideas, rationalities that are subjecting and are regulating his/her teaching practices and work. At the same time, the mathematics teacher becomes an agent within diverse dispositives, favoring diverse interests and rationalities. In both cases, knowledge and knowing are related with power, by promoting ways of being, doing, which lead to discursive practices and to fabricate subjectivities.

Currently, we can appreciate that a large part of discourses are rooted in a logic of competition that responds to globalization, more specifically towards a globalized economy, a globalized knowledge, and a globalized education. Dispositives and discourses formulated are leading and are subjecting the mathematics teacher into permanent training and lifelong learning.

When the mathematics teacher becomes a product, it creates the conditions wherein the mathematics teacher is confronted against other mathematics teachers; the mathematics teacher is confronted against him/her self, and the mathematics teacher is confronted against the ideal mathematics teacher. This final product—the mathematics teacher—must always be in the avant-garde and satisfy all needs. But, how could the mathematics teacher be always in the

avant-garde? The one sure way to achieve this is through certain dispositives, and, in this way, to ensure the convergence toward the ideas, ideals, rationalities, and subjectivities that are being promoted by society. Therefore, permanent training and lifelong learning are central for society since the mathematics teacher's development can be controlled.

Moreover, the mathematics teacher becomes an agent. This leads us to think of the teacher as a means for progress and for the success of society. By fabricating subjectivities and reaffirming rationalities and by setting, from discursive practices, the "real" and the accepted, the teacher becomes part of power's dispositives of societies of control.

From discourses, we can think that the mathematics teacher is socially constituted and fabricated to follow norms and standards. But historically, norms and standards have been imposed on the teacher, even if these don't have a relation with his/her history, context, and trajectory. For example, current society is seeking a mathematics teacher's standardization in response to the idea of globalization and social progress, with the promise of a better and brighter future, which has been accepted without resistance, but why don't we resist? A possible answer could be because it is part of our subjectivities as modern citizens.

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