THE DISCOURSE OF MATHEMATICAL ABILITY: AN ARCHAEOLOGICAL APPROACH

O DISCURSO DA HABILIDADE MATEMÁTICA: UMA ABORDAGEM ARQUEOLÓGICA

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ABSTRACT
This article is an effort to understand and analyze the discourse of mathematical ability through an archaeological approach. We recognize and discuss the association between the discourse of mathematical ability and the three following discourses: standardizing as a means of effectiveness, the distinction between manual and intellectual labor and the "superiority" of mathematical engagement. Moreover, we distinguish between two forms of the discourse of mathematical ability: the biological determination of giftedness and the notion of ability within a meritocratic context. These discourses function as an obstacle in the formation of positive identities in relation to mathematics for students of certain backgrounds. We argue that the deconstruction of these discourses is a necessary condition for an equitable mathematics education.

Key words: mathematical ability, discourse, archaeology, biological determinism, meritocracy.

RESUMO
Este artigo é um esforço para compreender e analisar o discurso da habilidade matemática através de uma abordagem arqueológica. Reconhecemos e discutimos a associação entre o discurso da habilidade matemática e os três discursos seguintes: padronização como meio de eficácia, distinção entre trabalho manual e intelectual e "superioridade" do engajamento matemático. Além disso, distinguimos entre duas formas do discurso da habilidade matemática: a determinação biológica do dom e a noção de habilidade dentro de um contexto meritocrático. Esses discursos funcionam como um obstáculo na formação de identidades positivas em relação à matemática para alunos de certos contextos. Argumentamos que a desconstrução desses discursos é uma condição necessária para uma educação matemática equitativa.

Palavras-chave: habilidade matemática, discurso, arqueologia, determinismo biológico, meritocracia.

1. Introduction

The reasons why some students succeed in school while others do not and the role of school in students' unequal performances are two of the most important issues examined by Sociology of Education. In the 1960s, it was made clear that biological differences cannot explain students' different school performances or IQ-tests' results, whereas social privileges do. Furthermore, the education institutions seemed to legitimize and reproduce social inequalities, rather than reduce them (Fragoudaki, 1985). Bourdieu's interpretation of this issue highlights the "ideology of giftedness", as the main factor that legalizes these functions of the education institutions (Bourdieu, 1985).

In this article, we examine the discourse of mathematical ability, by adopting a Foucauldian perspective and by using Foucault's archaeological method. We choose the term "discourse" rather than "ideology", because discourses are perceived not only as contents, texts, ideas and narratives, but mainly as forms of power that construct, regulate and govern the subjects (Pechtelidis, 2011). Our concentration on mathematics is related to its special social role: it is considered as abstract, logical, absolute and able to count or develop somebody's intelligence.

2. The discursive construction of reality

Starting point of all discourse theories is that our access to reality is mediated by language. More specifically, not only is a pre-existing reality reflected through language, but it is also through language that reality itself is constructed (Philips & Jorgensen, 2009). Foucault (1987) talks about discourses and discourse analysis as:

> "a task that consists of not -of no longer- treating discourses as groups of signs (signifying elements referring to contents or representations) but as practices that systematically form the objects of which they speak. Of course, discourses are composed of signs; but what they do is more than use these signs to designate things. It is this *more* that renders them irreducible to the language and to speech. It is this 'more' that we must reveal and describe." (p.77)

According to Foucault, it is through discourses that people construct their identities and subjectify themselves. Discourses specify what is possible to be said, done, and thought, at a particular time; they have real, material effects on people's lives, both by formulating institutions and constituting subjectivities (Chronaki & Pechtelidis, 2012). As Walshaw (2007) argues, talking about "talented", "charismatic" or "struggling" students is not just a usage of terms or words; it actually forms the limits inside which students are allowed to experience learning.

By the term "archaeology", Foucault refers to a method of writing history, through the analysis of "truth games". The main objects of an archaeological approach are the ways in which discourses were produced and systems of thought were developed in their historical context (Walshaw, 2007). In this article, we try to understand how the discourse of mathematical ability was produced; which discourses or regimes of truth support it; and in which ways certain limitations, with their space and time reference, allow or prevent the discourse of mathematical ability from developing. In the first part of this article, we refer to three discourses that are associated with the discourse of mathematical ability: standardizing as a means of effectiveness, the distinction between intellectual and manual labor and the “superiority” of mathematical engagement. In the second part of the article, we discuss two discrete forms of the discourse of mathematical ability and the conditions under which each of them was produced.

3. Three discourses associated with the discourse of mathematical ability

Standardizing as a means of effectiveness, the hierarchical distinction between intellectual and manual labor and the “superiority” of mathematical engagement are discourses that have dominated the public sphere in western societies. Their examination will be helpful in our effort to understand the discourse of mathematical ability, since all three of them are associated and support the idea that some people are able to do mathematics, whereas others are not.

3.1 Standardizing as a means of effectiveness

Standardizing is based on the idea of creating an ideal model and implementing it in order for a goal to be achieved. Standardizing as a means of effectiveness (or –in other words- the usage of the model in order to judge effectiveness) is deeply rooted in the modern western way of thinking. However, it has not always existed as such and is not dominant everywhere. In western thought, it was introduced by Plato and is not detected in the Homeric epics, while it is not met in Chinese philosophy (Jullien, 2012). Standardizing as a means of effectiveness is important in our study, because –as we will see- it is a precondition for the notions of mathematical ability and giftedness.

Let us first concentrate on mathematics as a field of study. According to Jullien (2012), mathematics is the prime field that is structured around the design of a perfect model. The -ancient Greek by origin- idea that mathematics is the language by which we can understand the world or in which God created the world came to be a dominant European idea, through Galileo, Descartes and Newton. Nowadays, this perception is hegemonic in science.

At the same time, the idea that effectiveness can be achieved through standardizing is at the core of how education institutions and mathematics education function: curricula define the intended goal and the ways in which it can be achieved at a given school level. Those who cope are successful in mathematics, whereas those who go beyond the ideal model of their class are characterized as competent, intelligent or charismatic. The students who do not understand the existence of the model or do not conform to it are in a worse position than those who are characterized as “bad students”: they are outsiders, if not foreigners to the education process.

The reason we find importance in talking about the way in which effectiveness is conceived, is that through this terminology we can better understand two major concepts and their implications in Mathematics Education: the concept of progress and the concept of rationalism. More specifically, education research and policies seem to aim at building a society that keeps "going forward" through the creation of rational citizens.

In the vast majority of Mathematics Education's articles, neutrality and universality of mathematics are presented as objective truths, as part of a "common sense" without ideological sign (Valero & Pais, 2015). Moreover, since the end of World War II, mathematics educators have sought to contribute to the creation of a rationally organized democracy, which does not leave room for extremism and totalitarianism. As a result, the aim of mathematics education became the empowerment of the general competences of the 21st century citizens by creating children who can think logically (Walkerdine, 2013).

3.2 Distinction between manual and intellectual labor

Fragoudaki (1985) maintains that the distinction of people between “clever” and “stupid” implies the hierarchical distinction between intellectual and manual labor. This hierarchical distinction is strongly associated with the social division of labor in societies, where manual workers get lower salaries and have lower prestige than intellectual workers.

The correlation between the reproduction of labor distinction and education has been mainly studied by French Marxism. The main representatives of this ideological stream understand the distinction between manual and intellectual labor to be in the core of production relations. As a result, they argue that school reproduces the social formations by reproducing on the one hand this distinction, along with the ideological hegemony connected to it, and on the other hand the relations of domination-subordination (Laskos, 2006).

The exclusion of manual labor from school and the school’s devotion to intellectual labor creates a subordinate position for manual labor (Laskos, 2006). More specifically, school seems to suggest that academic knowledge is superior to any other (Popkewitz & Nikolakaki, 2012), leading to a distinction of students between capable and incapable of serving this "high-level" work. Thereby, the categories of competent and incompetent are produced as natural and biologically predetermined, ignoring the social conditions that led to this ability or inability.

In addition, the distinction between manual and intellectual labor is reflected in the dominant discourses about mathematics and mathematics education. Walkerdine (2013) argues that as far as mathematics is concerned, there is a distinction between two qualitatively different kinds of knowledge and thought. She writes:

> This distinction is a recognition of the fact that when people wish to complete some practical task successfully they may do so simply by following rules, by applying a procedure, but still have little idea of why the rules are effective, or of their range of application. On the other hand, people who apply a procedure and at the same time know its rationale may have a deeper understanding of the meaning of what they are doing and why the procedure works. In discussions of mathematics

> education the distinction has gone under different names. Most often "basic skills" or "computational techniques" are counterposed to "understanding." (p. 93)

Walkerdine (2013) points out that the distinction between "procedural" and "propositional" form of knowledge is included in curricula, based on the view that the application of rules is sufficient for daily life, but in order for someone to really know mathematics, the understanding of its theoretical background is needed. Gellert (2013), while studying the corresponding activities in two -low and high level- mathematics textbooks of Britain, finds that what students are asked to do in the two cases is very different:

> One is the manufacturer of a mathematical tool which is used in situations of reality, while the other is simply the operator of this tool. One learns mathematics and its applications in situations of reality, while the other learns the use of mathematics in handling situations of reality. (p. 54)

This example highlights the immediacy and intensity of the correlation between the two binary distinctions: manual over intellectual labor and learning basic skills over understanding. The two different discourses of the textbooks contribute to different students' subjectifications, with regards both to their intended relationship with mathematics and their professional prospects.

3.3 The "superiority" of mathematical engagement

Often characterized as the "queen of sciences", mathematics is a special field of study, in that mathematical engagement includes an aspect of "superiority". Various are the social facets of mathematics that support this perception, including its non-connection to the "social", its consideration as a field of practice for the mind, its being able to model and solve "real problems" and its abstract nature and beauty.

Valero (2005) points out that mathematics is rarely perceived as something that may be related to the "social" (e.g. power relationships, political affairs and actions, values and forms of living such as democracy). Typically, it is understood as numbers, rules and procedures; issues that have no connection with people and their everyday lives in society. This perception can be traced back to ancient Greece, to the time of Plato. The Platonic idea that mathematics is outside the mind and goes beyond humanity importantly upgrades mathematics' position, in an obvious way (Walshaw, 2007). At the time of Plato, the distinction between arithmetic (number theory) and accounting (the art of calculation) is clear and prioritized. Plato considers accounting to be useful to the warrior and the trader and arithmetic to be necessary involvement of a philosopher (Boyer & Merzbach, 1997). The inscription at the entrance of Plato's Academy "Μηδείς ἀγεωμέτρητος εἰσήτω" ("Non-geometers shall not enter") indicates the debt of philosophy to mathematical science, reflecting the Pythagorean idea of the prominent role of mathematics in nature and knowledge of "the being" (Mpaltas & Stergiopoulos, 2013).

In addition, as noted by Chasapis (2013), mathematics is considered to be a field of practice of the mind, while good performance in mathematics has been associated with human intelligence since Plato. Plato writes (Chasapis, 2013, p. 83):

> [526b]And yet have you noticed this, that those who have talent in numerical calculations show a natural ability in almost every learning; also that those who have slow-moving minds, if trained and practiced in this, even if they derive no other benefit, all of them make at least some progress so that their mind becomes more sharp?

In this context, we can also understand how mathematics forms a strongly gendered field of science and knowledge, more than any other science. In a patriarchal society, the male mind is thought of as being perfect for abstract thinking and objective sense, while women are conceived as unsuitable for mathematics (Chronaki, 2013). Overall, mathematics preserves a mythologized public image; it is thought to be an alien, extrinsic and inhuman subject that is associated with an internal search for accuracy, abstraction and absolute truth (Chronaki & Pechtelidis, 2012).

Furthermore, mathematics has become a tool for modeling and shaping the world. Barwell (2013) maintains that mathematics is used as a means of understanding the world through description, prediction and communication. However, the mathematical *discourse* does not simply serve as a means of understanding and, therefore, mathematics also shapes the world about which it speaks. As Borba & Skovsmose (1997) argue, the "ideology of certainty" becomes hegemonic in mathematics. This ideology is based on two assumptions: firstly, the idea that mathematics is pure and universal as its truths do not rely on any empirical investigation and cannot be influenced by any social, political or ideological interest, and secondly, the idea that mathematics is able to model and solve within its context any kind of problem.

Finally, mathematics is perceived as "the queen of sciences", because of its abstract nature and its conceptual beauty (Gellert, 2013). A mathematician, as an individual, when understanding mathematics, experiences aesthetic pleasure and an opportunity for creation. "The certainty, the order and the production -through trial and error process- of theorems which give a posteriori the impression that they always existed and waited just to get discovered may pique the interest." (Walkerdine, 2013, p. 94)

The above is a useful lens through which one can think about issues concerning the power given to mathematics and the discussion regarding empowering students through mathematics. Gutiérrez (2013) summarizes the argument of the power of mathematics, as implied in many policy documents and curricular textbooks, as follows:

> "Mathematics, as a rational, universal, and logical discipline is located in a unique position to be the ultimate arbiter of truth. Its ability to model the real world and to maintain a kind of internal certainty gives evidence of this privileged and earned position. Something proven with mathematics is seen to have final say." (p.47)

In this sense, since mathematics has power, whoever knows mathematics has strength. Therefore, it appears necessary to empower students through the learning of mathematics.

Pais (2012) argues that mathematics does empower students; but not because it provides a special knowledge or ability, rather because -through its conceptualizations- mathematics gives value to people.

4. Two forms of the discourse about mathematical ability

Although we have been referring to the “discourse of mathematical ability” as a general category, it would be wrong to think of it as a homogenized discourse that entails a single facet. Instead, this discourse of mathematical ability can be individualized in various ways. As an illumination of the above, Askouni (2007) observes that the terminology of “stupid or dumb students” used to be common, while now is unethical. Yet, the key-idea that only some students are able to do well at mathematics has not diminished.

In the following, we will outline two forms of the discourse of mathematical ability and giftedness, and we will discuss what makes each of them possible in their historicity. The first discourse conceptualizes mathematical ability in a biologically deterministic context, whereas in the second discourse the meritocratic context is dominant.

4.1 The biological determination of giftedness

Both in ancient Greece and in pre-capitalist societies, knowledge was a privilege that was only reserved for the upper class and their offspring. The accessibility to knowledge was therefore only hereditary. According to the dominant ideology of feudal societies, each talent was understood as a "divine gift". Those people who held it reserved the right to hold supremacy in society and to transfer their hereditary privileges (Katsikas & Kavadias, 2000). The transition from feudalism to capitalism is characterized by the loss of institutionalized privileges held by the upper classes. In this context, the "ideology of hereditary giftedness" that is based on blood and descent was replaced by the "ideology of personal giftedness", which has to do with individual intelligence and effort (Daskalakis, 2014). Now giftedness or in particular mathematical giftedness is not considered as the result of divine action or the product of heredity, but is considered to be biologically determined.

To understand this transition, we need to turn our attention to the role that school takes on in capitalist societies, as opposed to the feudal ones. A significant change is the emergence of mass schooling in the 19th and 20th centuries. Education started being maintained and controlled by the state and it started aiming to prepare citizens and workers for the modern industrial needs (Spring, 1987). The introduction of compulsory education –an important milestone in the history of education- is accompanied by three important processes: the implementation of state control in education, the professionalization of teachers and the development of scientific pedagogy (Nikolakaki, 2012). The institution of school now plays a central role in the maintenance and reproduction of society and social relations. In this context, mathematics plays the role of a social filter, determining the intrinsic abilities and the intelligence of people (Chasapis, 2013). Social inequality and existing social relations are maintained and vindicated by the social reproduction of the belief in natural intelligence, resulting in the latter being very difficult to change (Fragoudaki, 1985).

At the same time, science itself is based on this approach. The perception that cognitive abilities are biologically predetermined is ingrained in science itself, leading to efforts for its quantitative determination (IQ-tests). Although the analysis of IQ-test results shows that intelligent people are met in specific classes, social and racial groups, there continue to be theoretical researchers who draw social conclusions based on the idea of humans' biological differences (Fragoudaki, 1985). These scientific results are of great significance, as research forms what is imaginable in practice (Pais & Valero, 2012). However, the fact that the study of human intelligence and the construction of methods for its measurement were made within a scientific framework does not give these approaches the value of objective knowledge. As Valero (2008) points out: "Research creates discourses about phenomena and objects which do not necessarily exist as such, but that exist in as much as the power/knowledge of the scientific endeavor has phrased them and, therefore, created them" (p. 45).

4.2 The notion of ability within a "meritocratic society"

Today, the interpretation of poor performance as a result of reduced intelligence is not legitimate and most teachers can confirm the non-existence of stupid children (Askouni, 2007). However, school success continues to be interpreted as a result of giftedness, while failure is attributed to lack of capacity or lack of effort (Milonas & Dimitriadi, 1999). Therefore, Askouni (2007) and Milonas and Dimitriadi (1999) refer to a qualitative "mutation" of the "ideology of personal giftedness", which formed the "ideology of meritocracy".

Meritocracy is a basic tenet of capitalism. "In a meritocratic society, individuals acquire positions and powers depending on their value and everyone has the ultimate responsibility for both her successes and failures" (Benincasa, 2013, p.1). Although meritocracy also appears as a concept in the previous phase, in this new phase it appears to have an enhanced role. In a meritocratic view, it is assumed that every individual has some value, which is a combination of skills and talents, and of the work that someone does to succeed. Work is a strong measure for meritocracy precisely because of the sense that work is the main factor that a person can affect (Alvarado, 2010).

In a meritocratic framework, certain mechanisms are presupposed, within which the "value" of an individual is assessed. The main such institution is school, the whole function of which is associated with testing and evaluation; a function that can be traced to a series of practices, including compulsory exams, excellence awards, national exams and global competitions such as PISA. These practices act as mechanisms of discrimination against and exclusion of some students, always under the umbrella of meritocracy. Therefore, presented as neutral, fair, objective and impartial, under the guise of equal opportunity for students, school presents social advantages as individual talents and social disadvantages as personal disabilities (Daskalakis, 2014).

Finally, the distribution of individuals in “appropriate” positions in the production or management is intertwined with the discourse that delivers value to technocracy. Through the opposition of "ideological" and "realistic" views of the world, the idea that the “technocrats” are best suited to lead a country is constructed. They, unlike politicians, have demonstrated their efficiency and ability to operate beyond ideological divisions, towards a “meritocratic” common good (Lialiouti, 2013). This discourse has value in our study because it is directly related to the discourses about mathematics and about the aims of mathematics education. Borba’s and Skovsmose’s "ideology of certainty" supports the possibility of technocracy while mathematics is converted into a “passport” for progression. Mathematics, advertised as non-political and non-ideological, becomes an important contributor to un-ideological politics.

5. What intervened?

At this point, we need to raise the question of what has intervened and placed the correlation "capacity-effort" at the heart of the discourses for the interpretation of students’ school performances. According to Askouni (2007), it is the cluster of two factors: scientific developments and social movements intending to democratize education.

a) The developments in science (genetics and sociology of education) in the 1960s make it clear that biological differences or mental intelligence cannot explain uneven school performances. IQ-tests’ results reveal that intelligence is shared unequally among social categories. Members of the upper social classes appear to have a higher IQ than members of the lower ones and white Americans higher intelligence than African Americans. This fact -as long as we accept that "God or nature cannot hand intelligence to people through class, ethnic and racial criteria" (Fragoudaki, 1985, p. 109) - points out that IQ-tests measure something that is socially constructed.

Developments in Mathematics Education further illustrate the issue. We argue that the meritocratic discourse surrounding mathematical ability is directly linked to the creation and increase in influence of the demand for "mathematics for all" in Mathematics Education, both as a field of practice and as a scientific field.

Today, both the necessity of mathematical training and the importance of mathematics and its applications for the advancement of our societies is generally accepted and undisputed. However, mathematics began being a key subject of schooling only in the late 19th century. In the 1970s, mathematics education aimed at ensuring success of those interested in the subject, whereas during the 1980s the matter of democratization of mathematics education arose and the "mathematics for all" demand was raised (Valero, 2013). Pais (2012) points out that the very same discourse that defends the importance of mathematics in the formation of "full" citizens -and in this context seeks "mathematics for all"– includes the germ of exclusion in itself.

The attempts for democratization of mathematics education are in an obvious way connected to a sense of awkwardness towards the uncritical assumption of a biological determinism with regard to the mathematical ability of students. However, the effort to teach mathematics successfully to all students in an equitable way is related to the importance attached to mathematics as a tool for the advancement of society and its citizens (Pais, 2012). The standard for a thinking citizen who can make rational decisions can allegedly be achieved through mathematical training. However, what would it mean in this context if some people are *de facto* not capable of acquiring this mathematical training? The importance given to mathematics in the formation of rational citizens along with an acceptance of the existence of students who "do not get it" directly challenges the core policy function of modern democracy, as it doubts the adequacy and competence of some of its citizens.

b) The achievements of social movements challenged the interpretation of school failure as a result of reduced intelligence. European and American academic circles around the 1960s affected the political movements of the time and, hence, played a role in the strengthening of the demand for school democratization. As far as we know, the questioning of the existence of cognitive intelligence itself did not arise from the political and social movements of the time, at least not on a large scale. Nonetheless, the democratization of education engaged in harsh criticism of the existing perceptions on ability, leading, *inter alia*, to a loosening of school norms and divisive practices.

6. Towards new discourses

This article engages with the notions of mathematical ability and giftedness, using a Foucauldian perspective. The Foucauldian approach in education research and, particularly, in mathematics education research provides crucial insight into the language and methodology that questions the most solid truth regimes that have been built into the discussions on education. As argued by Dussel (2010), after Foucault, we cannot effortlessly say that education is related solely to improving people or promoting social progress. It thus makes sense to address questions about the way in which discourses compose both reality and subjects and to reflect on the discourses that manufacture concepts, such as that of the "effective teacher" or the "gifted student".

We have attempted to understand the discourse of mathematical ability and giftedness through an archaeological approach. In the first part of the article, we recognized and discussed the association of three discourses in connection to the discourse of mathematical ability. Firstly, we saw that within the field of mathematics education, effectiveness is considered to be achievable through standardizing processes. Secondly, we determined that the distinction between manual and intellectual labor is correlated with the distinction between learning basic mathematical skills and understanding mathematics. Finally, we illustrated how the discourse of mathematical ability is affected by the public image of mathematics and its social position as a superior activity. In the second part of the article, we distinguished between two forms of the discourse of mathematical ability: the discourse of mathematical ability in a biologically deterministic context and the discourse of mathematical ability in a meritocratic context. To illustrate this, we discussed how social movements and developments in science led to the qualitative mutation of the former discourse into the latter.

We concentrated on the discourses surrounding mathematics because of their importance in forming the available identities for students. Throughout our engagement, we noticed that the discourse of mathematical ability is associated with discourses that are highly controversial as far as their validity and equity impact are concerned. We intended to provide further insight into the effort to recognize facets of inequity in the education practice that prevent students from forming positive identities in relation to mathematics. As Mendick (2007) shows, the discourses surrounding mathematics and gender make the “capable-in-mathematics” category rare among students, and even more rare among female students. Under this perspective, we need to conduct further research towards clarifying how the discourses around ability affect students' subjectifications, the ways in which these discourses are embodied in the formal school curricula, the ways in which they occur in and affect school classrooms and, last, but not least, the ways in which they are confronted in education research itself.

If we want to move towards an equitable mathematics education, we need to think about what makes mathematics inaccessible to certain classes and racial or gender groups. The narrative that some students are naturally gifted with a mathematical talent is in the core of inequality reproduction. At the same time, it is deeply rooted in what we conceive as mathematics and mathematics education. As Walshaw (2013) notes, inequity in mathematics persists even after structural barriers have been removed, because “the prevailing discourse lacks the analytic power to change existing formations” (p. 116). Therefore, for an emancipatory mathematics education, we need to work towards both the deconstruction of the existing discourses about mathematical ability and -at the same time- the creation of new discourses about mathematics and mathematics education.

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7. References

Alvarado, L. A. (2010). Dispelling the Meritocracy Myth: Lessons for Higher Education and Student Affairs Educators. *Vermont Connection, 3*, 10-20.

Askouni, N. (2007). *Social Inequalities in School.* Athens: YPEPTH.

Barwell, R. (2013). The role of mathematics in shaping our world. In *Teaching Secondary Mathematics as if the Planet Matters* (pp. 3-15). New York: Routledge.

Benincasa, L. (2013). *Trying or copying? Student narratives and social doing.* Retrieved October 8, 2014, from: http://www.rhodes.aegean.gr/ptde/revmata/issue-67.html.

Borba, M., & Skovsmose, O. (1997). The Ideology of Certainty in Mathematics Education. *For the Learning of Mathematics 17*(3), 17-23.

Bourdieu, P. (1985). School as a Conservative Force: Scholastic and Cultural Inequalities. In A. Fragoudaki, *Sociology of education* (pp. 357-392). Athens: Papazisi.

Boyer, C., & Merzbach, U. (1997). *The history of mathematics.* Athens: Pneymatikou.

Chasapis, D. (2013). Social inequality and mathematics education: From the recognition of a reality to understanding the terms of its creation. In: D. Chasapis (Ed.) *Language, race, gender and social class in learning and teaching of mathematics.* Athens: EKPA.

Chronaki, A. (2013). Introduction. In V. Walkerdine, *Counting Girls Out (Studies in Mathematics Education).* Athens: Gutenberg.

Chronaki, A., & Pechtelidis, Y. (2012). "Being good at maths": Fabricating gender subjectivity. *Journal of Research in Mathematics Education*, *1(3)*, 246-277.

Daskalakis, D. (2014). About social inequalities in education. In D. Daskalakis, *Issues of sociology of education* (pp. 15-46). Zefyri: Diadrasi.

Dussel, I. (2010). Foucault and education. In M. W. Apple, S. J. Bal, & l. &. Gandin, *The Routledge International Handbook of the Sociology of Education.* London: Routledge.

Foucault, M. (1987). *The Archaeology of Knowledge.* Athens: Eksantas.

Fragoudaki, A. (1985). *The socioogy of education.* Athens: Papazisis.

Gellert, U. (2013). Social class in mathematics classroom: A sociological perspective in textbooks, dialogues and exams. *Language, race, gender and social class in learning and teaching of mathematics.* (pp. 37-56). Athens: EKPA.

Gutiérrez, R. (2013). The Sociopolitical Turn in Mathematics Education. *Journal for Research in Mathematics Education 44(1)*, 37-68.

Jullien, F. (2012). *Conference on effectiveness.* Irakleio: Panepistimiakes Ekdoseis Kritis.

Katsikas, X., & Kavadias, G. (2000). *Inequality in Greek education.* Athens: GUTENBERG.

Laskos, C. (2006). *The sociology of education in Greece-Theoretical trends and foundations.* Thessaloniki: Unpublished PHD Thesis.

Lialiouti, T. (2013). Aspects of political communication during the crisis in the light of the transformation of the Greek party system. In ESHEA, *Crisis and Political System.* Athens: Morfotiko Idryma ESHEA.

Mendick, H. (2007). *"I could always just play": gender and mathematical ability.* paper presented at: Promoting Equality in Mathematics Achievement, Barcelona.

Milonas, T., & Dimitriadi, A. (1999). From inequality towards school, to the exclusion inside the classroom. *School failure and Social Exclusion. Causes, Consequences and Treatment* (pp. 385-408). Athens: Ellinika Grammata.

Mpaltas, A., & Stergiopoulos, K. (2013). Introduction. In A. Mpaltas, & K. Stergiopoulos, *Philosophy and Sciences in the 20th Century*. Hrakleio: Panepistimiakes Ekdoseis Kritis.

Nikolakaki, M. (2012). The educational system from modernity to postmodernity: Challenges and dilemmas. In T. Popkewitz, & M. Nikolakaki, *Critical perspectives in the politics of education: the changing terrains of knowledge and power.* (pp. 39-60). Athens: Sideris.

Pais, A. (2012). A Critical Approach to Equity in Mathematics Education. In O. Skovsmose, & B. Greer, *Opening the cage: Critique and politics of mathematics education* (pp. 49-93). Rotterdam: Sense Publishers.

Pais, A., & Valero, P. (2012). Researching research: mathematics education in the Political. *Educational Studies in Mathematics*, *80*, 9-24.

Pechtelidis, Y. (2011). *Sovereignty and Resistance. Post-structural Approaches of Education.* Athens: Ekkremes.

Philips, L., & Jorgensen, M. (2009). *Discourse Analysis; Theory and Method.* Athens: Papazisis.

Popkewitz, T., & Nikolakaki, M. (2012). Introduction. In T. Popkewitz, & M. Nikolakaki, *Critical perspectives in the politics of education: the changing terrains of knowledge and power*. (pp. 19-38). Athens: I. SIDERIS.

Spring, J. (1987). *A primer of Libertarian Education.* Athens: Eleftheros Typos.

Valero, P. (2005). What has power to do with mathematics education? *Social and Cultural Aspects of Mathematics Education: Proceedings of the 4th Dialogue on Mathematics Teaching Issues* (pp. 25-43). University of Thessaloniki.

Valero, P. (2008). Discourses of power in mathematics education research: Concepts and possibilities for action. *PNA 2(2)*, 43-60.

Valero, P. (2013). Mathematics for all and the promise of a bright future. *Proceedings of the 8th Congress of European Research in Mathematics Education (CERME 8)*, (pp. 1804-1814). Antalya.

Valero, P., & Pais, A. (2015). Examining political perspectives in mathematics education. In C. Bergsten, & B. Sriraman, *The non-contributions of Jablonka: Festschrift in Celebration of the 51st birthday.* Charlotte, NC: Information Age Publisher.

Walkerdine, V. (2013). *Counting Girls Out; Studies in Mathematics Education.* Athens: GUTENBERG.

Walshaw, M. (2007). *Working with Foucault in Education.* Rotterdam: Sense Publishers.

Walshaw, M. (2013). Post-Structuralism and Ethical Practical Action: Issues of Identity and Power. *Journal for Research in Mathematics Education 44(1)*, 100-118.