

PROBLEMATIZING “MATHEMATICS EDUCATION FOR SOCIAL JUSTICE”

Gustavo Bruno, Natalia Ruiz López

Faculty of Teacher Training and Education

Autonomous University of Madrid

Abstract: In this presentation we explore conceptions of social justice and of mathematics education for social justice (MEfSJ). We recover examples from research literature that both attempt a definition and/or link MEfSJ to a set of concerns related to gender equity, access, democracy, ethnicity, and social background. Other examples show a link between MEfSJ and notions of Critical Mathematics Education/Pedagogy. And other examples show more or less substantial challenges to, and tensions in, our attempt to conceptualize MEfSJ. Positioning ourselves in a socio-political understanding of ME, we also explore the origins of the notion of social justice in the 19th century. Finally, we attempt to articulate that historical understanding of social justice with a socio-political approach on ME, testing that articulation with some present-day concerns and research examples.

Introduction: “MEfSJ”, a heterogeneous set of concerns

Atweh (2004, 2007) points out that although, the expression “social justice” (SJ) appears related to issues of gender, ethnicity/multiculturalism, socio-economic factors, and inequity in access and failure, in Mathematics Education (ME) research spaces there isn’t a precise definition of SJ itself. This lack of theoretical engagement has not stopped certain changes in policies and practices, however. Atweh indeed attempts a multidimensional concept of SJ, but he admits that “due to the limited theorization of the concept from within mathematics education, we will rely on works from outside the discipline itself” (Atweh, 2007, p.4).

Mathematics Education for Social Justice (MEfSJ), as theoretical and practical concern, has been somewhat addressed in the works of Frankenstein (1983, 2001), with the notions of critical mathematics pedagogy and the idea of Critical Mathematics Literacy Curriculum. Similarly, Gutstein (2012) uses the suggestive label of “Mathematics as a weapon in the struggle”. He describes his work as teaching mathematics for social justice or critical mathematics, but also affirms that:

I have adopted this more radical phrasing because, in 2007, then-President Bush travelled to South America and claimed that the U.S. was promoting “social justice” there. When I heard that, I remembered that others can appropriate our language, and so I starting using words that resist easy cooptation. Briefly, I mean by this that, “students need to be prepared through their mathematics education to investigate and critique injustice, and to challenge, in words and actions, oppressive structures and acts” Gutstein (2012, pp 24).

We understand that in these perspectives, mathematics knowledge is not only technical or contemplative but also political, in the sense that it can help to reveal, understand and fight social injustices (inequalities). Mathematics is a knowledge that can be used by the dominant classes to oppress but that could (or should?) be reclaimed by the oppressed sectors in their struggle for emancipation and self-determination.

Skovsmose (1994) articulates the notion of the formatting power of mathematics. The contemporary world is, in substantial ways, normalized through the language of mathematics and its algorithms, especially regarding the technologies of information and communication. Mathematics can generate the critical structures of society as much as read them. Participation as a critical citizen in a democracy requires mathematical knowledge capable of addressing the critical structures of society. So, Skovsmose considers that the whole movement of MEfSJ is an example of Critical Mathematics Education (CME), or that MEfSJ relates to a critical stance on mathematics education (Alrø et al., 2010).

Skovsmose & Valero (2005) consider that reflecting on the relation between ME and SJ (whose meaning they approximate to democracy, or equity/equality, or inclusion) is a challenging issue. The challenges come from the complexity of the informational society at any scale (local and global), the difficulty of defining mathematics and mathematics education, and the ambiguities of the idea of “democracy” (and SJ, we add!). But there are also challenges from factual and conceptual-linguistic disagreements between ME and SJ. There is the possibility of intrinsic resonance between ME and democracy/SJ if “proper teaching and learning” empowers students. There is the possibility of dissonance between ME and SJ, because evidence shows that in many cases ME has functioned as a mechanism of systematic exclusion of students on the grounds of gender, ethnicity, social class, etc.

Christiansen (2007) analyzes theoretical and practical tensions in the acting-research of a ME for Democracy (a perspective that we also, intuitively, would link to MEfSJ). About the idea of mathematical competencies for democratic participation, she observes that the value of mathematical statements and their relation to the issues of “critical citizenship”, do not function in the same way in Denmark as in other parts of the world. In post-Apartheid South Africa, the most significant challenge was furthering equality in access and living conditions.

More digressions: Mathematics Education as political

The picture becomes even more complex. At least Pais (2012), Rasmussen (2010), Straehler-Pohl (2015), and more recently Gellert (2017), from different approaches, address the idea that mathematics education, as part of the school system, is a device of social selection and stratification, a credit system, a technology for the production and allocation of human resources. Andrade-Molina and Valero (2017) and Valero (2017) have addressed also the molding of subjectivities through mathematics education. Gutiérrez (2013) contends that:

If, as a field, we are not willing to recognize the political nature of mathematics education or the fact that teaching and learning are negotiated practices that implicate our identities, we might as well give up on all of this “talk” about equity. (Gutiérrez, 2013, p. 27)

In Madrid, for example, we perceive these traits of mathematics education through the serious joke of the “sciences person vs letters person”. To be a “sciences person” means being apparently good in physics, chemistry, biology, but mostly, good with numbers, good at math... (in school, that is!). But to be a “letters persons” could be a wide range of things: from liking Latin and Greek, to being good in economy, to just being awful at math (in school) and choosing any life path as far away from math as possible. Also, in the Spanish unconscious collective, the identification as a “letters nation|culture|country ‘lagging behind’ the more advanced science nations|culture|countries” could be a cultural trait. Our research interest also considers how this idiosyncratic subjectification process in Spanish culture could be linked to ME, and why it is never understood as an issue of SJ in ME research.

A notion that can allow us to reflect on this political nature of ME is what Valero (2010) proposes as a “network of social practices of mathematics education”. From that perspective, the classroom and the school practice are not the only object of research on ME, the context of the classroom is not merely interference or an influence in an otherwise clean practice. School, classroom and “con-text” (as Valero expresses in the mentioned article) are mutually constitutive. Relation is real, constitutive of the phenomena of study, and not purely a modal or extrinsic denomination. Consequently, there are a number of new, potentially legitimate research concerns in ME, which may include: research discourse and practice, its contradictions and complicities with policy-making spaces, public perceptions and mass media depictions, “common-sense” statements (such as “mathematics for all”), (international) assessment practices... and the interweaving and connections through which these nodes define each other, by their relative positions and tensions, etc.

So far, we adhere to the perspective of ME (in our western societies, in Spain in particular), as a governmental procedure, a social engineering, a subjectifying technology (in the line of a Foucauldian approach and the extensive work of Valero in that frame, e.g., Valero, 2017). Our research interest is, thus, about the domestication of mind and bodies, the establishing of certain truths, and the governmentality through the far-reaching, inherently political, technology of ME. Some of those cannot always be addressed in preexisting categories of gender, race, ethnicity, socio-economic background, religion. Those are legitimate concerns, but perhaps we are looking for a non-existing Leviathan, a mind-body frame, the desired citizen (in the line of, e.g., Andrade-Molina, 2017).

So, the search for a somewhat satisfying formulation of SJ to address these research concerns, and to articulate it with a political understanding of ME, carried us to the origins of the discussion about SJ in the 19th century.

The historical setting of the origins of *social justice*.

In the book titled *Saggio Teoretico di Dritto Naturale Appoggiato sul Fatto* (Theoretical Treatise on Natural Law Based on Fact) (1840), and in different essays, articles and monographs, the Jesuit priest Luigi Taparelli d'Azeglio (1793-1862) studied political concepts such as social justice, representation, sovereignty, nationality, and, most crucially, solidarity and subsidiarity. He was the founder of the journal *La Civiltà Cattolica* in 1850. As Behr (2004) argues, the historical setting in which he started these theoretical developments was the pressure of dramatic social change and political violence, the unstoppable force of the industrial revolution, the emergence of the liberal nation-states across Europe. For the Italian peninsula, the evolving milieu was the attempt of political unification, known as the *Risorgimento*.

In this situation, and with the effects of widespread social inequity already generating great social unrest all throughout Europe (which would culminate in the dramatic revolutions of 1848), the competing political and economic models were, amongst others, Comte's Positivism, Stuart/Mill's Liberalism/Utilitarianism, and later, Marx and Engel's dialectical materialism. According to Behr (2004), Taparelli's intention was to develop a theoretical understanding of the social changes that could go beyond the pious platitudes. Traditional religious discourse was open to attacks from the privileged class, because criticizing greed was seen as promoting revolution, and advocating the patience of the proletariat left it open to the typical accusations of religion being the opiate of the masses.

At the Collegio Romano in the 1820's, Gioacchino Pecchi, future Pope Leo XIII and founder of what would be called Catholic Social Teaching in the encyclical *Rerum Novarum*, was one of Taparelli's students. So, as Behr (2004) argues, Taparelli has fair reason to be considered one of the fathers of Catholic Social Teaching, as many fundamental notions are of his elaboration. At the same time, his brother Massimo Taparelli d'Azeglio was a liberal politician and one of the most notable public figures of the Italian *Risorgimento*. The events of the time and their mutual correspondence show they were fierce enemies in the political terrain and loving brothers.

Considerations of a classical natural-law approach

Taparelli (1866) understood that human beings are rational animals, provided of intelligence and free will. Throughout many philosophical arguments, that implies the development of a classical moral theory (virtues, perfection, fulfillment), a theory of human rights and duties, and of course a theory of the nature of society. As Behr (2004) explains, he developed this approach to prevent the extremes of the individualist and collectivist perspectives, that is, society as the mere aggregate of individual atoms or as a whole that supersedes and absorbs the parts.

To our understanding, the key is the Aristotelian notion of *zoon politikon* (*political animal*, a fundamental concept that appears both in the *Nicomachean Ethics* and the *Politics*), although not directly addressed by Taparelli. This notion means that humans are not merely social animals like others in the natural world but, because of intelligence and free will, humans naturally tend to the polis, i.e., the politically

organized society/community. The notion of political here should be understood against the background of Aristotelian philosophy, encompassing more than what we understand today as ballots, elections, ideologies and mechanisms of power.

That doesn't take away the "power" dimension in the idea of politics (because the polis is organized with an authority), but for Aristotle, the notion had a lot more to do with the public dimension of the moral development of the human person, in the polis or the city-state, and with the striving for the common good. Even more, the main *raison d'être* of the state or any other kind of civic or political association, (or more precisely, of the authority of any political entity), is the provision of the common good. If it fails in that end (for incompetence, corruption, ignorance, or whatever), the authority is null.

But in this way, the authority of the consorzio will not be any more a true authority, nor will the consorzio be free in that case; once deprived of its own being, it will be more than a mass of individuals enclosed in certain limits of space. (...) Indeed, what is authority? It is the right to order the society to (the common) good; then, the less exposed to disorder the reason of the superior, the more true and pure his authority will be (Taparelli, 1866, para. 707; our translation).

The Socio-Political theory and social justice

For Taparelli, as a matter of historical fact and natural law, every human society beyond a certain size (bigger than a family or partnership, for example) is constituted by other societies. These intermediate societies in which human life flourishes he called *consorzi* (consortia). Moreover, he calls a society large enough to provide for the common good of its members (which today we would identify as a city, a full state, or even the Greek city-state) a *protarchy*. Other forms of intermediate societies are the *deutarchies*, a kind of larger, more autonomous consortia.

How can the *deutarchies* form a *protarchy*? They can do it either by composition (by natural, free or forceful association) or by division of a *protarchy*. This formation may come to be through different historical or political processes. The *deutarchies* can either pre-exist the *protarchy* or come to be after it. Every kind of society, at every level, is given its unity of being by its proper ends (its own "common good"), its own authority and its own operation (Taparelli, 1866, para. 689).

The critical principles for understanding the rightful articulation of those levels of society, i.e., social justice (which are rooted in a natural-law anthropological view) are: *socialità* (sociality, which later became identified with solidarity) and *dritto ipotattico* (hypotactic right or law, derived from a grammatical expression, hypotaxis, which refers to the rules of subordination between clauses in a complex sentence), which was later assimilated under the label of *subsidiarity*.

By sociality Taparelli meant the rights and, especially, the duties to others. More concretely, the principle of sociality can be synthesized, according to Behr (2003) as the duty to seek the good of others. And by subsidiarity, Taparelli meant:

Every consortium must conserve its own unity in such a way as to not lose the unity of the larger whole; and every higher society must provide for the unity of the larger whole without destroying the unity of the consortia. (...) given the facts of the association, it would be as against nature for the consortia to reject the unity of the social whole as it would be for the whole to abolish the consortium...(Taparelli, 1866, para. 694-695).

Taparelli called this kind of complex society a “hipotactic association”. Of course, he conceded that in this arrangement, the consortia and the protarchy lose certain independence and specific freedom, but for both individual persons and societies of the whole, that means the possibility of enjoying a greater liberty and achieving a good greater and more fulfilling than what they could achieve on their own. In this way, they could enjoy the participation in the common good, that is, the republic.

Social justice is, thus, according to Behr (2004), a norm and habitus, (a social virtue, an arrangement of the political whole, a habitus of collective action), directed towards the common good, according to the principles of sociality and subsidiarity.

Taparelli was clear in admitting that these definitions only made sense in the concrete, historical and actual configurations for each society. But he argued that sociality and subsidiarity were evident from a natural-law argument and as a matter of fact, as an historical reality.

One example of a completely opposite view of the state is the classical Leviathan of Hobbes. As Behr (2004, p. 15) cites, Hobbes considered that the intermediary associations between the state and individuals were a “divisive” influence in the unity of the body politic, as “worms in the entrails of man”. That view is a logical consequence of an individualistic-egoistical anthropology, in which by norm the state must enforce society, and opposite to the zoon politikon of Aristotle. Behr (2004), citing Taparelli in an 1859 article of *La Civiltà Cattolica*, says:

Once these associations, that form the organic parts of the larger society are destroyed, society finds itself essentially altered, reduced to a powder of scattered atoms, lacking all cohesion, all special function, and chained to total dependence on the supreme force [the state], a heap of purely passive, inorganic molecules. (Behr, 2004, p.8)

After all this analysis, our main question is: can we still speak about Mathematics Education for Social Justice, without the concern of just using a “hollow incantation” (Hayek, 1976)? We will attempt to articulate the use of the expression SJ in a precise, meaningful way, from a socio-political stance in ME; and exemplify it with actual and ongoing research projects and perspectives.

ME and Social Justice: homogenizing society, piercing through the *consortia*.

Following the Foucauldian approaches to subjectification and governmentality, the aseptic, neutral, instrumental trait of mathematics prevalent in ME discourse and practice promotes the adoption of an individualistic perspective in the desired citizen and worker (Valero, 2017, p.11); the inception (Andrade-Molina, 2017, p. 183) of a neo-liberal world-view. Mathematics becomes at the same time feared, perhaps

rejected, but accepted by its symbolic power (Sáenz & García, 2015, p. 26). The individualistic pursuit of success or acceptance of failure is epitomized in the way ME school practice, and the mathematization of the entire credit system in education, operates and divides students.

This double character of ME as technology of subjectification and government points towards a process of control and homogenization of society, at the level of individualities, accepted truths, and access to resources. Of course, a high-tech homogenized society of individualistic, atomized personalities is at odds with the notion of hypotactic association. It's almost the complete opposite of what Taparelli had in mind when he crafted the concept of social justice (SJ) with all its subtleties.

The era of the strong, centralized nation-states, during which the notion of SJ was first formulated, is arguably gone. But the capitalistic system (with its homogenizing tendencies and its essentially individualistic anthropological premise) persists as strong as ever, albeit in mutated forms. In that sense, Pais (2011, p.29), citing Žižek, calls capital "the concrete universal". For us, it means that it can be still relevant to consider the Taparellian notion of SJ in the present state-of-things of universalized capitalism (as *the* paradigm of production of good and services), and the role of ME as a (small but key) tool for the reproduction of that "concrete universal".

ME, as a political technology, is thus at odds with the idea of a pluralistic society of societies, arranged in SJ. It's hard to imagine that molecular individuals, passively (or not) allocated to different roles would have a tendency to "act critically and actively as citizens" - not as isolated, abstract individuals, but by the forming of consortia. Let's see two concrete examples for testing this complicated analysis.

The first: in a recent (2017) Service-Learning experience, addressing the question of the "Sciences person vs Letters person" divide, we asked some students if having "shaky" grades in mathematics equated to being a "letters person". One of the students said: "how could you be a 'sciences' person, if you are bad at math"? "Bad" at math implies a non-sciences person, in an absurdly artificial division of sciences vs letters that does not correlate to the concrete, actual composition of society. An artificial category that pre-conditions how the people understand themselves and the society in which they live, regulating top-to-bottom the ways in which they could (maybe, if ever) associate in consortia to participate in political life.

The second: on a more historical note, Apaza (2017) has researched on the ME issues of the Ayllus of the High-Andean regions of Perú. The Ayllus are traditional communities of familiar base and pre-Incan ancestry. Apaza proposed a reinterpretation of the Yupana, a traditional kind of abacus of the High-Andean cultures, for promoting a ME experience. Under disguise of practice-oriented PhD work, Apaza (2017, p. 88-104) distinguished between the Western rationalistic, and the High-Andean relational, rationalities. Implicit there was, of course, the issue of (post)colonialism, not only by the "force of bayonets" but by the imposition of foreign norms of reason and regimes of truth.

The perennial low-achievement in ME of the High-Andean Ayllus is both a symptom and an excuse: a symptom of the homogenizing pressure to adapt the foreign norm of reason and to leave behind the historical culture, political rights, and with those, lands and material goods. The Ayllus are, in any crazy Taparellian dream we could have, deutarchies, pre-existing the colonial process and the international homogenizing trend of capitalistic globalization. ME is a small, but significant, mechanism of that whole assimilation-disarticulation process, piercing directly the unity of that deutarchy, a real societal order. The excuse is the failure/achievement, the improvement of mathematics achievement through the replacement, with modern ME, of the mathematic and scientific culture proper to the pre-colonial Andean civilizations. The failure correlates to the label of deficient and primitive pre-assigned to the High-Andean cultures, which ME kindly corroborates.

ME and SJ: Teachers and Researchers.

Another anxiety for which we intend an articulation, between a socio-political stance on ME and SJ, is the relation between ME research and teaching practice. Valero (2010), with the key notion of ME as a network of social practices, uses the metaphor of the context as “that surrounding accompanying and constituting the text, [which] does not fall inside the research gaze” (p.8, our emphasis), and explains the prevalence of abstract models in ME research practices such as the didactic triangle. Pais (2017) also considers that ME research lives in a world of its own making, in a state of narcissism, but at the same time, with the irony of “research’s beautiful souls” (p. 59), he points to the un-assumed complicity of ME research with policy making spaces of dubious interests.

The socio-political issue that draws our attention is a kind of paradox: ME research seems to live in the clouds in regards to actual school practice, its recipes and recommendations don’t work to overcome systemic failure, and the school practice is very static along the years. Yet ME research practices, many times close to the policy making spaces, are actually very influential in school practice through devices such as external assessment, curricular developments, and discourses about the wonders of the use-value of mathematical knowledge, its neutrality and objectivity.

A school is, no doubt, a consortium. However, historically, many schools were created precisely by the nation-states of Taparelli’s years, as consortia for the fabrication of certain social order. So, the question is: is it truly SJ the way in which researchers in ME at the same time remain detached, assess, and regulate teaching practice (or teachers), thereby influencing policy making? We know the relation between ME research and ME teaching is not the same in every country or community. So, what could a proper, rightful, just, relation between the two kinds of practices be? Is it possible to imagine that ME, composed of persons and other material goods, is a kind of hypotactic association, with a unity of order towards a common good? That would imply a deep reflection on the role of researcher and teacher and the relations between them.

Of course, that is nothing new to say. But the situation in which researchers are mostly (if at all) responsible towards policy making spaces, economical agents, their superiors and fellow researchers and institutions, but never towards the persons and consortia which are affected by their practice, is an issue of flagrant social injustice. The hierarchy of researchers as superiors in the food chain to both teachers and students is assumed and implicit, but not justified.

Final Thoughts

We conclude with some policy recommendations: there is need for more funding, resources and research, improved curricula and teacher training, teachers and students must...Nah.

REFERENCES

- Alrø, H., Ravn, O., & Valero, P. (Eds.). (2010). *Critical mathematics education: Past, present and future: Festschrift for Ole Skovsmose*. Sense Publishers.
- Andrade-Molina, M. (2017). *(D)effecting the child. The scientifization of the self through school mathematics*. (Doctoral dissertation). Aalborg: Aalborg University Press.
- Andrade-Molina, M., & Valero, P. (2017). The Effects of School Geometry in the Shaping of a Desired Child. In H. Straehler-Pohl, N. Bohlmann & A. Pais (Eds.), *The disorder of mathematics education – Challenging the socio-political dimensions of research* (pp. 251-270). Switzerland: Springer International Publishing.
- Apaza, H. (2017). *La Yupana, material manipulativo para la educación matemática. Justicia social y cambio educativo en niños de las comunidades quechuas alto andinos del Perú*. (Unpublished doctoral dissertation). Universidad Autónoma de Madrid.
- Atweh, Bill (2004). Towards a Model of Social Justice in Mathematics Education and its Application to Critique of International collaborations. In Putt, Ian and Faragher, R. and McLean, M., (Eds.) *Proceedings Mathematics Education Research Group of Australasia* (pp. 47-54). Townsville, Australia.
- Atweh B., Keitel C. (2007) Social (In)Justice and International Collaborations in Mathematics Education. In Atweh B. et al. (Eds). *Internationalisation and Globalisation in Mathematics and Science Education*. Dordrecht; Springer
- Behr, T. C. (2003). Luigi taparelli D'azeglio, SJ (1793-1862) and the development of scholastic natural-law thought as a science of society and politics. *Journal of Markets and Morality*, 6(1).
- Behr, T. (2004). Luigi Taparelli and social justice: Rediscovering the origins of a “Hollowed” concept. *Social justice in context*, 1(1), 3-16.
- Christiansen, I. M. (2007). Some tensions in mathematics education for democracy. *The Montana Mathematics Enthusiast*, 3(3), 49-62.

- Frankenstein, M. (1983). Critical mathematics education: an application of Paulo Freire's epistemology. *Journal of Education*, 165(4), 315-339.
- Frankenstein, M. (2001). Reading the world with math: Goals for a criticalmathematical literacy curriculum. *The Australian Association of Mathematics Teachers Inc.*, 53.
- Gellert, U. (2016). Revisiting Mathematics for All: A Commentary to Pais's Critique. In H. Straehler-Pohl, N. Bohlmann & A. Pais (Eds.), *The disorder of mathematics education – Challenging the socio-political dimensions of research*: (pp. 67-87). Switzerland: Springer International Publishing.
- Gutiérrez, R. (2013). The sociopolitical turn in mathematics education. *Journal for Research in Mathematics Education*, 44(1), 37-68.
- Gutstein, E. R. (2012). Mathematics as a weapon in the struggle. In Skovsmose, O. and Greer, B. (Eds.), *Opening the Cage: Critique and Politics of Mathematics Education* (pp. 23–48). Rotterdam: Sense Publishers.
- Hayek, F. (1976). *The Mirage of Social Justice*. Routledge and Kegan Paul.
- Pais, A. (2011). *Mathematics education and the political: An ideology critique of an educational research field*. (Doctoral Dissertation). Aalborg Universitet. Institut for Læring og Filosofi.
- Pais, A. (2012). A critical approach to equity. In O. Skovmose & B. Greer (Eds.), *Opening the Cage. Critique and Politics of Mathematics Education* (pp. 49-92). Rotterdam: Sense Publishers.
- Pais, A. (2017). The Narcissism of Mathematics Education. In H. Straehler-Pohl, N. Bohlmann & A Pais (Eds.), *The Disorder of Mathematics Education. Challenging the Sociopolitical Dimensions of Research* (pp. 53-63). Switzerland: Springer International Publishing.
- Rasmussen, P. (2010). The critical perspective on education and on mathematics education. In H. Alrø, O. Ravn, & P. Valero (Eds.), *Critical Mathematics Education: Past, present and future* (161-169). Rotterdam: Sense Publishers.
- Sáenz, C. & García, X. (2015). *Matemáticas: placer, poder, a veces dolor. Una mirada crítica sobre la matemática y su enseñanza*. Madrid: UAM ediciones.
- Straehler-Pohl, H. (2015). Mathematics, practicality and social segregation. Effects of an overtly stratifying school system. *Revista Internacional de Educación para la Justicia Social (RIEJS)*, 3(1), 55-70.
- Skovsmose, O. (1994). *Towards a philosophy of critical mathematics education*. Dordrecht: Kluwer Publishers.
- Skovsmose, Ole & Valero, Paola. (2005). Mathematics education and social justice. *Utbildning & Demokrati : Tidsskrift för Didaktik och Utbildningspolitik*. 14.

- Taparelli, L. (1866). *Saggio teoretico di dritto naturale appoggiato sul fatto*. (J.M. Orti y Lara, Trans.) Civiltà cattolica. (Original work published 1857)
- Valero, P. (2010). Mathematics education as a network of social practices. In V. Durand-Guerier, S. Soury-Lavergne, & F. Arzarello (Eds.), *Proceedings of the Sixth Congress of the European Society for Research in Mathematics Education*. (pp. LIV-LXXX). Lyon: Institut National de Recherche Pédagogique.
- Valero, P. (2017). Mathematics for all, economic growth, and the making of the citizen-worker. In T. S. Popkewitz, J. Diaz, & C. Kirchgasser (Eds.), *A political sociology of educational knowledge: Studies of exclusions and difference* (pp. 117-132). New York: Routledge.