
Uncertainty, Pedagogical Imagination, Explorative Reasoning, Social Justice, and Critique

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It is autumn 2014. Well, actually it is not. It is springtime, because as I write this I am in Brazil, preparing my talk for the Eighth International Mathematics Education and Society conference (MES8). I was really happy to receive the invitation to make this talk. I was here in the very beginning, giving a Plenary in MES1 in Nottingham in 1998.

In my talk this time I will address the question: *What could critical mathematics education mean for different groups of students?* I am not going to argue for distinguishing between *critical mathematics education* and *mathematics education for social justice*. I believe we are dealing with two largely overlapping educational approaches. So the title of my talk could just as well be: *What could mathematics education for social justice mean for different groups of students?*

The text I am presenting here, however, is not the text for my talk. Instead in this paper, I address some philosophical issues that might only appear implicitly in my talk. Specifically, here I will reflect on the notions of uncertainty, pedagogical imagination, explorative reasoning, social justice, and critique.

Uncertainty

The notion of critique has deep philosophical roots. So has uncertainty, but that has rather different roots. I want, however, to point out profound connections between the two notions.

Let me acknowledge at the outset that my discussion of philosophy is confined to European philosophy. Considerations of the philosophical contributions of other cultures—indeed of the different ways in which “philosophy” might be diversely conceptualised—and

of the potential for deep cross-fertilisation, lie beyond the scope of this paper, though all of those issues are of profound relevance for what I am saying.

In Antiquity, Plato and Socrates were united in the fight against uncertainty. They did this by confronting scepticism as advocated by sophists such as Protagoras and Gorgias, both involved in heated dialogues with Socrates. Augustine and Thomas Aquinas also fought against uncertainty, this time in terms of doubt with respect to religious dogmas. It was feared such doubt would cause a dangerous opening for heresy.

René Descartes was deeply troubled by scepticism. He wanted to eliminate any possible space for scepticism by identifying a foundational epistemic bedrock that could not be shaken by any form of doubt. On this bedrock the whole edifice of knowledge should be raised. Immanuel Kant was also disturbed by scepticism, in particular as it had been formulated by David Hume. As a response, Kant wanted to provide a critique of the very structure of knowledge by identifying the universal categories which form that knowledge. Kant tried to demonstrate how such categories ensure that we can know mathematics, as well as universal natural laws, with certainty. Thus to Kant a critical activity served to identify the sources for epistemic certainty.

Karl Marx provided a new dimension to critical activities. Through his critique, he not only addressed political and economic ideas and assumptions, but also the very political and economic structures themselves. This way he formed a critique of the political economy as part of real political forces. According to Marx, such a critique should be based on scientific insight, and not just on well-intended opinions and initiatives. Anarchism, as for instance that formulated by Pierre-Joseph Proudhon, had provided a radical critique of a range of social issues. But Marx did not want to be associated with this form of critique, which he found superficial. According to Marx, critique needs to be based on a profound scientific analysis as illustrated by his own meticulous investigations of the logic of economic development. Thus different as they are, Descartes, Kant, and Marx all tried to connect critique with certainty.

I acknowledge the importance of the profound development of critical ideas. However, the notion of critique which I want to apply leaves aside any connection, implicit or explicit, with certainty. To me

one can criticise any assumed form of knowledge, assumptions, and ideology as well as any social, political, and economic institutions, but we cannot assume the existence of any solid platform for doing so. Whatever form of critique we conduct, it might include misunderstandings, limitations, and confusions. In this sense a critical activity becomes a profoundly uncertain activity. In fact I see *critique as an expression of uncertainty*.

However, I do not think we should let ourselves become paralysed by this observation. I do not subscribe to any version of the following argument: since we cannot be sure that the critique is appropriate, we better do nothing. Instead we actively have to face the *paradox of critique*: We are facing so many critical issues that we need to address, but at the same time we must acknowledge that our insight is too limited to do so in any adequate way. Any critique can be expected to be insufficient, but still, it remains a necessity.

When I talk about critical mathematics education I also acknowledge the paradox of critique. There are simply too many critical issues related to mathematics education that are in need of being addressed. But we do not have any adequate theoretical or practical basis for ensuring any such critique can be conducted adequately. This applies when we address: social exclusion through mathematics education; unjustified trust in mathematics-based information; strategies for providing empowerment through mathematical literacy; etc. Also critical mathematics education becomes an expression of uncertainty.

Pedagogical Imagination

Criticising something also means imagining that things could be different, because it is through a critique that one also expresses visions, hopes, and aspirations. Thus I see imaginations as a profound element of a critical activity, and imaginations carry with them a strong sense of uncertainty.

The first time I became aware of possible connections between imagination and critique was when I was reading *Sociological Imagination* by C Wright Mills. The idea of a sociological imagination is precisely to express alternatives to observed sociological facts. A sociological imagination provides conceptions of possible alternatives. If no alternatives to a particular sociological fact are identified,

the fact appears as a necessity. A sociological imagination, however, reveals that we are dealing with, not a necessity, but a contingency: it could be different. To reveal that certain facts are not necessities but contingencies is an important critical activity.

In connection with education I refer to pedagogical imagination. The idea is, however, the same: through a pedagogical imagination one tries to conceptualise alternatives to what is taking place – for instance in terms of ways of organising: interactions in the classroom, the content of the curriculum, the tasks set for homework, etc. A pedagogical imagination can help to reveal that certain educational facts are not necessities but contingencies. I refer to this form of revelation as a modulation of facts. A modulation indicates spaces for possible changes and I find that modulation forms a principal part of a critical activity.

The descriptive paradigm characterises much research in the social sciences as it also does in education. In this paradigm, neither sociological nor pedagogical imagination is assumed to play any role. According to this paradigm one has to research “what is the case” and not “what could be the case”. Positivism is an expression of the descriptive paradigm.

In *Naturalistic Inquiry* from 1985, Yvonna S. Lincoln and Egon G. Guba distance themselves from any form of positivism by pointing out what they refer to as the “myth of the positive given”. They do not assume the existence of an objective reality which can be uncovered through meticulous investigations. Instead they consider reality to be constructed and these ideas have already had a huge impact on much qualitative research in mathematics education.

Yet still, I feel that “naturalistic inquiry” as well as “positivist inquiry” belongs to the descriptive paradigm. While positivism focusses on what is assumed to be positively given, naturalism concentrates on what has been constructed. Neither of these two approaches includes imaginations as playing any important role in research. Neither positivism nor naturalism provide for modulations. Both represent an imagination-zero approach by concentrating on providing descriptions of “what is” and ignoring providing conceptions of “what could be”.

Modulations, however, constitute a defining element in Michel Foucault’s genealogy. Through detailed historical studies, he tries to show how different sociological facts emerge through historical

processes. He shows how facts become constructed through a dynamic of power. The processes are historic, they are contingent and so consequently what we observe could be different.

At times, Foucault has been compared to Kant with respect to epistemic profoundness, and this seems to be a valid comparison. Kant wanted to identify the principal categories that structure human knowledge. Foucault also wanted to identify a profound structuring of knowledge. But while Kant looked for this structuring in terms of eternal and pure categories, Foucault presented the structuring in terms of discourses that include presumptions, idiosyncrasies, historical particularities, as well complex networks of powers.

Foucault was deeply inspired by Friedrich Nietzsche's profound perspectivism. There does not exist any platform from which one can make any all-encompassing speech about the structures of the world, or about our knowledge about it. Ontology and epistemology operate within their own limited perspectives. According to Nietzsche, Kant was just playing with us when he assumed he was able to present universal categories for grasping the world. Big words from philosophers do not say anything about the world, they merely indicate in what direction the philosophers' own nose is pointing. This brought Nietzsche to recognise the profound dynamics of power that operate in any ontology and epistemology. With this inspiration, Foucault engaged in genealogical studies revealing this power dynamics within a range of domains.

Much research in education, and also in mathematics education, is inspired by Foucault and shares an interest in providing genealogies. What is taking place in mathematics education can be interpreted as formed through complex historical processes operating within a dynamic of social, political, economic, and discursive forces. This is certainly important to address. However, several Foucault-inspired approaches do not open space for pedagogical imaginations. In fact within much Foucault-inspired educational research, I have, several times, met the idea that providing suggestions for educational alternatives is an expression of romanticism. Thus genealogical studies might lead to the insight that certain facts are constructed within a given political and economic structure, and given this structure, we have to deal with necessary facts.

I agree that speculating about alternatives might be romantic. But still I do not want to assume any such version of an imagination-zero

approach. To me a genealogy may provide a first step in a modulation, but we have to engage in pedagogical imaginations as well. Thus I see genealogy and pedagogical imagination as two important features of a critical activity.

Explorative Reasoning

The relevance of pedagogical imaginations became clear to me during a period that I was involved in a project in South Africa supervising a group of PhD students in mathematics education. The project took place during the initial post-apartheid period (see, for instance, Vithal, 2010).

The South African educational system had been formed through decades of regimes of apartheid and colonisation. Naturally, it is important to address, also in post-apartheid research in mathematics education, what has taken place, but the PhD students I supervised certainly felt it imperative also to investigate what could be done *instead*. It appeared important to investigate, for instance, the dynamics of multicultural mathematics classrooms. But where should we go to observe such classrooms? What could be observed were only classrooms in a segregated educational system, since the educational patterns and structures cultivated during the apartheid period were not changed overnight. Certainly the actual *segregated* classrooms could be addressed through a naturalist approach; they could as well be subjected to a genealogy that would reveal how the brutal logic of apartheid has turned into the logic of schooling. But how were we to explore alternatives?

A pedagogical imagination appears an important part of making this step, but how could one in a more specific way research what is not the case? How were we to explore in more detail the features of a pedagogical imagination? This question brings me to the notion of *explorative reasoning* see Skovsmose, 2014b, and Skovsmose and Penteadó (in press), for additional discussions of researching possibilities).

I will illustrate what I have in mind here by a simple and constructed example (real-life examples from the South African project are, for instance, presented in Vithal, 2003). Let us then engage in a brief episode of pedagogical imagination, and let us just assume

that we are in the initial years of the post-apartheid period. We can imagine how issues about the geography of apartheid could become addressed in terms of maps showing the locations of different neighbourhoods. It could be a map of Durban showing the locations of white neighbourhoods and of black townships, and how Indian neighbourhoods have been inserted as buffer zones in between the two. We might imagine how this geography of apartheid becomes addressed in a multicultural mathematics classroom. We might also imagine how we could engage students in educational processes that provide multicultural understanding and respect.

We could imagine so many things, and our imaginations could certainly include illusions. This might only be an expression of the romantic. But we could try to qualify our pedagogical imaginations, by trying out at least something driven by this imagination. For instance, we could try to bring some children from different neighbourhoods together, at least for some lessons. We could try to engage them in examining some of the maps. However, what we in fact might be forced into doing would most likely turn out to become rather different from what we had imagined. The actual classroom activities we were conducting might need to be adjusted to the existing curriculum, to the priorities of the schools, to the parents' priorities, and to many other things.

But we did do something. Was it an experiment? Certainly not in the sense that we carefully planned what we were going to do. We did not get hold of parameters that might have an impact on what is taking place, and that needed to be considered when we interpret what we have observed. We were really not in control of anything.

Anyway, explorative reasoning takes as its departure what we did, but not in order to try to draw conclusions strictly *about* what took place. Through an explorative reasoning we try to qualify our pedagogical imagination. For instance, we might recognise that we must consider in greater detail the tensions that could emerge in a multicultural setting. We might become aware that some issues are experienced as too controversial, as they highlight the borders that might run through the multicultural classroom. We might recognise that some issues engage the students much better than others. We might qualify much better our ideas about reading maps. We might get new conceptions of dimensions of the geography of apartheid. We might identify other possibilities for exploring these dimensions

in mathematics education. In this sense explorative reasoning helps to qualify the content of our pedagogical imaginations.

Thus what we in fact did, we consider an open window through which we might consider better our pedagogical imaginations. Explorative reasoning draws from what has taken place, but is not directing itself towards conclusions about what has taken place. Through an explorative reasoning we try to investigate our conceptions of educational possibilities.

Social Justice

Like critique, the notion of justice is deeply rooted in philosophy. In the dialogue *The Republic*, Plato addresses the question: What is justice? Plato finds that it makes perfectly good sense to search for the proper definition of justice, as we are dealing with an entity belonging to the world of ideas. The sophists, however, negated the possibility of reaching any such definition. There does not exist anything such as justice. Thus since antiquity, the conception of justice has been part of philosophical controversies.

Thomas Aquinas interpreted justice from a religious perspective, as an expression of the will of God. Certainly Friedrich Nietzsche would oppose any attempts to define justice, and he might laugh loudly if presented with a notion such as “mathematics education for social justice”. Most likely he would associate conceptions of justice with a slave morality, as he did with conceptions of democracy. Within a liberal tradition the conception of justice has been addressed by John Locke and John Stuart Mill. They proposed a naturalistic perspective not drawing on any religious interpretations at all.

The very notion of “social justice”, however, only appeared in the 19th century, coined by Luigi Taparelli, a Jesuit who was deeply inspired by Aquinas and who emphasised the religious features of the concept. These ideas were explored further in *The Constitution Under Social Justice (Costituzione secondo la giustizia sociale)*, first published 1848 written by the catholic priest Antonio Rosmini-Serbati. Here we find the notion of social justice related to a range of ideas, reaching from social perspectives to strong religious assumptions.

A very important contribution to the discussion of social justice is represented by John Rawls in *A Theory of Justice*, first published in 1971.

Here Rawls provides a detailed review of the concept of justice, in particular as it has been elaborated in the liberal tradition and viewed through the lenses of analytic philosophy. However, Rawls brings his investigations beyond this tradition by acknowledging not only the descriptive part, but also the action part of social justice. It becomes a concept that calls not only for critical reflections but also for critical actions. I see *A Theory of Justice* as a most important contribution to the overall discussion of social justice.

Also within mathematics education one finds profound contributions to the overall conception of social justice. In *Reading and Writing the World with Mathematics: Toward a Pedagogy for Social Justice* from 2006, Eric Gutstein provides a careful interpretation of Paulo Freire's notions of "reading and writing the world". Gutstein (2006) illustrates what "reading and writing the world with mathematics" could mean. Thus he establishes a unique conceptual source for pursuing social justice through mathematics education, and illustrates the power of this source through a range of examples (see also Gutstein (2003, 2012)). In particular Gutstein brings us to see the importance of the activist feature of such an education. (For presentations of mathematics education for social justice, see, for instance, Gates, 2006; Sriraman (Ed.), 2008; and Wager and Stinson (Eds.), 2012. See also Skovsmose, 2011; and Skovsmose and Greer (Eds.), 2012.)

In the article "A Broad Concept of Social Justice" from 2012, Ubiratan D'Ambrosio provides a weighty reinterpretation of social justice. He leaves behind any of the elements of analytic philosophy that might be lingering in Rawl's *A Theory of Justice*. D'Ambrosio relates justice to the most basic conditions of human life. Thus he brings us to connect social justice to, for instance, freedom of choice, well-being, security, peace, and spiritual experiences. In this way he establishes a diversity of cultural and political features as integral parts of social justice. Simultaneously, D'Ambrosio relates social justice to the way mathematics does operate and may operate in society. In particular he emphasises that mathematics, as a most universal form of thinking, might help in providing ways of addressing some of the most universal problems of humanity, as for instance the technology-fabricated changes of nature.

To me conceptions of social justice have much to do with pedagogical imagination. While explorative reasoning might help to bring specificity to imaginations, interpretations of social justice might

provide broader scopes to these imaginations. Thus interpretations of social justice with reference to “reading and writing the world with mathematics” provide new directions for pedagogical imaginations. In a similar way, expressions like “freedom of choice”, “well-being”, and “peace” might open new landscapes of imaginations.

Several other notions, as wide open as social justice itself, can have similar functions. One can think of, for instance, autonomy, democracy, *conscientização*, responsiveness, and empowerment. They all belong to this extended family of notions that may provide fruitful soil for pedagogical imagination. (See Skovsmose and Penteadó (in press) for a discussion the importance of a notion like democracy for the formulation of pedagogical imaginations.)

Critique

As I have already emphasised I am not interested in making any distinction between mathematics education for social justice and critical mathematics education. In fact other general labels are in use as well such as “responsive mathematics education” (see, for instance, Greer, Mukhopadhyay, Powell, and Nelson-Barber (Eds.), 2009). Such trends in mathematics education belong to the same family, but let me now recapitulate some features of the notion of critique.

Uncertainty is to me an inevitable part of a critical activity. We should not try to eliminate uncertainty by assuming the existence of some unquestionable theoretical, philosophical, or political foundations upon which a critical activity can be conducted. I am deeply inspired by any concern for identifying and reacting to any form of suppression and injustice, but at the same time I want to leave behind any assumptions of the existence of an elevated basis for doing so. In particular I do not assume that the notion of social justice has a well-defined kernel.

Pedagogical imagination relates to hopes, visions, and aspirations. To me a critical activity is not only addressing what is the case, but also what could be instead. As a consequence, I find that pedagogical imagination plays an important role in any form of critical education. And to me explorative reasoning is important in order to provide specificity to such imaginations.

Social justice is one of the notions that can provide fuel to

pedagogical imaginations. However, notion of social justice is in permanent need of being re-interpreted. In fact one can think of it as not only an open, but also as a contested concept. It invites many different and also profoundly conflicting interpretations. To me, we need not abandon such contested notions, as they have important roles to play in providing new perspectives. In this way a notion like social justice provides fertile ground for pedagogical imaginations.

Critique of mathematics forms an integral part of a critical mathematical education. Thus one cannot assume that mathematics represents any intrinsic good qualities as a result of the very nature of mathematics. As any form of knowledge, mathematics constitutes an integral part of social, economic, and political power-structures. This applies to any form of mathematics, although maybe in rather different ways. This applies to industrial mathematics, applied mathematics, academic mathematics, insurance mathematics, ethnomathematics, as well as to any stipulated forms of critical mathematics.

Critique by means of mathematics also constitutes an integral part of critical mathematics education. Thus mathematics can establish powerful means for expressing a critique of a range of states of affairs. In particular, I can refer to many examples of reading and writing the world with mathematics. In many such cases the mathematical investigations contribute profoundly to critical investigations. In this way there can a lot of sense in talking about critical mathematics (see Frankenstein, 2012; and Powell 2012). I prefer, however, not to use this label, as it might invite the idea that such a version of mathematics is not itself deeply in need of critique.

Critique of critical mathematics education forms an integral part of critical mathematics education. Paul Ernest (2010) has pointed out and exemplified the importance of such a critique, and I agree with him (see as well Pais, 2012). Any critical activity needs to be addressed by a critique. There is no escape from this circularity, and certainly I am not going to refer to this as any vicious circle. It could instead be considered a very healthy circle, a virtuous circle. No critical approach can assume any form of self-justification. Critique could always be different.

Mistakes form an integral part of critical endeavours. This applies not only to critical mathematics education. We should always be aware that no critical approach takes everything into consideration. Critique is partial, temporary, and preliminary. Critique includes blind

spots and operates within particular perspectives. We have always to acknowledge the paradox of critique. Critique is crucial, but it could be mistaken.

Illusions form an integral part of critical activities, but I do not think of illusions as simply a negative feature of critique. I find that imaginations form an integral part of critique, and, as a consequence, one cannot prevent illusion from forming a part as well. Imaginations might turn out to be illusionary; they might also turn out to be feasible. There does not exist any well-defined way of clarifying this in advance. In this sense critique turns into a profound constructive activity, although still being uncertain.

And now that all this has been said, I am going to continue preparing my talk, and let me stick to the title: *What could critical mathematics education mean for different groups of students?*

Acknowledgements

I want to thank Ana Carolina Faustino, Denival Biotto Filho, Peter Gates, Renato Marcone, Raquel Milani, João Luiz Muzinatti, Miriam Godoy Penteadó, and Guilherme Henrique Gomes da Silva for their helpful comments and suggestions.

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