

Disordering mathematics, citizenship and socio-political research in mathematics education amongst the “rubble of words”

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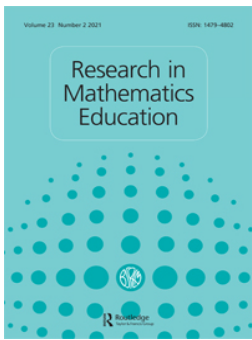
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Disordering mathematics, citizenship and socio-political research in mathematics education amongst the “rubble of words”

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ABSTRACT

In this contribution, we seek to problematise not just mathematics and (global) citizenship but also the process of researching with a critical intent. We argue for a disorderly approach and use researching our participation in a European funded project – the Project in Citizenship and Mathematics (*PiCaM*) – as an illustration of the complexities and contradictions involved. Despite the need for inconclusiveness and an awareness of how language is colonised, we argue for action and hope.

ARTICLE HISTORY

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curriculum resources;
disorder

Introduction

The catalyst for the thinking we share here was the moral and political difficulties and dilemmas raised by participation in a European (ERASMUS+) funded project – the *Project in Citizenship and Mathematics (PiCaM)* (<http://www.citizenship-and-mathematics.eu/>). The project focused on developing materials and practices to support teachers in engaging critically with the notion of global citizenship within and through their teaching of mathematics. The materials devised were to include both mathematics and global learning content with learning mediated through appropriate inclusive pedagogies, supporting an innovative, participatory approach to learning and to developing social, civic and intercultural ‘competences’ and critical thinking. [Here we see, even at the application stage, the compromised engagement with neo-liberal discourse as the language of ERASMUS is ‘fed back’ to the funders. ‘Competency’ thinking and its assertion of self-evidence has long been the subject of critique within socio-political research (for example, Jones & Moore, 1993; Povey & Burton, 1996).] The proposal was written with a commitment to critical mathematics education and radical citizenship in mind, a citizenship radical in two ways: radical as opposed to conservative and radical as requiring fundamental re-thinking. However, as we worked on the project, dilemmas and difficulties increasingly became apparent and it is these we try to explore (mostly without resolution) in this article.

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Troubling issues surrounding mathematics and (global) citizenship are discussed in this text as well as throughout this special issue. Here, however, we give equal weight to troubling mathematics education research itself through a preamble (where we discuss two governing technologies of academia), a section advocating disorder, an addendum (the purpose of which is defined at the end of the preamble) and through the text.

Preamble

As here, textual devices are often used by authors attempting to adopt a ‘disorderly approach’ to presenting their (mathematics) education research. But submission software makes strict textual and formatting demands, with the consequence that such devices are often not presented to reviewers. Our two reviewers were aware of this and expressed some concern that this prevented them from being able to provide fully effective feedback on the extent to which our device worked or didn’t work to unsettle the reader. This, in itself, was thought-provoking and was very useful in developing our conceptualisation of ‘disorderliness’ further.

Academic life, like all ways-of-being, is deeply embedded in and framed and understood by artefacts whose very familiarity makes them invisible, thus imbuing them with great power. This made Hilary think about a recent experience at an online mathematics education research seminar. A contributor was allocated ten minutes to initiate a discussion. Twenty minutes into the hour-long session, he had still not begun to speak on the topic – decolonising mathematics – as he struggled to make his PowerPoint work in the virtual environment. It seemed to Hilary that he, like many of us, had been ‘colonised’ by the presentation software owned by Microsoft – a company whose profits rose by 33% to \$15.5 billion during the Covid-19 pandemic in the quarter ending December 2020 (Weise, 2021) – and that he was no longer free to speak without it.



Image credit: Holyrood

Kirkaldy, Liam (2018). No recourse to public funds: How the UK's hostile environment policy is driving people into destitution. *Holyrood*, 17 January 2018. (<https://www.holyrood.com/inside-politics/view,no-recourse-to-public-funds-how-the-uks-hostile-environment-policy-is-driving-13757.htm>)

Meanwhile ... hundreds of vulnerable children as young as 10, who have spent most of their lives in the UK, are having their applications for British citizenship denied for failing to pass the government’s “good character” test.

And ... while enforcement has become tougher, gaining citizenship has become more complicated and more expensive. In fact, it costs thousands of pounds for someone to maintain their ‘leave to remain’ status.

In the case of this paper, the constraining, unremarked artefact of academic life is the article submission software, ScholarOne, jointly owned by Clarivate, market capitalisation \$17.5 billion (Clarivate Company Profile – Office Locations, Competitors, Revenue, Financials, Employees, Key People, Subsidiaries | Craft.co) and UNSILO and currently piloting the use of artificial intelligence to provide “decision support features for editors, improving the performance of paper screening with the potential to save millions of hours in peer review time” by pre-evaluating the content of papers before academic review (Clarivate Analytics and UNSILO partner to power ScholarOne with

AI – Clarivate). This object is unseen yet acts powerfully on the academic world of (mathematics education) research. An essence of the ‘disorderliness’ which we sought to embrace is precisely to unsettle the givens of the presentation of text and images on the journal page – but the unconsidered and unacknowledged artefact precluded us from doing this.

These two governing technologies of global capitalism colonise and regulate mathematics education research and its presentation, including that into interrogating how global capitalism colonises and regulates both mathematics and citizenship.

Further, a paradox is that the reviewers and editors alike wanted us to explain and justify what we were doing, an entirely reasonable request but, then, how could our textual ‘invasions’ unsettle? Now they would be expected and thus assimilated with comparative ease. How to find a way out of this conundrum in which we as authors and they as helpful reviewers and editors found ourselves enmeshed? We decided to address part of the issue directly in this preamble by extending what we had already said about *why* disorder; but to follow David Swanson’s approach to providing more detail:

Readers looking for some explanation of the form of this work will find a discussion in the addendum. If you feel lost and demand guidance, please head there and read the first few paragraphs at least. Others may wish to read the addendum later. Still others (e.g. the adventurous, the feckless, dreamers) are encouraged to avoid the addendum altogether. (2018, p. 134)

Why disorder?

Disorderliness represents a way to fight against the institutionalisation (and therefore the inevitable co-option and colonisation) of the socio-political dimensions of academic research in mathematics education (Straehler-Pohl, Lensing, Pais, & Swanson, 2018). The disorder of mathematics education attempts to destabilise taken-for-granted truths within the field:

the “socio-political branch” proclaims a critique of “mainstream” mathematics education to be at the core of its “collective identity” [but] ... the radicality of this critique is more often than not domesticized for the sake of ordering its object in a way that it suits well the story-lines that are commonly narrated. (Straehler-Pohl et al., 2018, p. 3)

We understand disorder to operate in two ways. First, to be a refusal of the taken-for-granted orderings of both mathematics and mathematics education research. ‘Common-sense’, natural orders gain their orthodoxy through hegemonic discourses which are neither innocent nor value-free. They conceal their own invention, constraining what it is possible to say and to think, and are intimately related to issues of power and domination: things are as they are and cannot be thought of as being otherwise. But, inevitably, something of the same becomes true as soon as any field of critique – like social-political approaches to mathematics education research – initially contested, itself becomes established: we are likely to be following our “radical educational agenda without posing any threat to the system that [we] criticise” (Pais & Costa, 2020, p. 10). Relentless acknowledgement of our own complicity in this new ordering is required at the same time as we struggle to “seriously rethink our ways of being in

the world as mathematics educators, and ... change our practices of thinking, asking, working, exploring, fearing, hoping, pondering, and so on” (Appelbaum, 2017, p. 277).

Natives: Race and Class in the Ruins of Empire

[The] assumption is that anyone who is not racialised as white is not really a citizen, echoing the old white-supremacist adage ‘Race and Nation are one’ and the ‘blood and soil’ logic of the Nazis ... [It is implied] that those of us who critique Britain’s historic and current injustices are not real citizens of this country ... the idea of race has been one of the most important ideas in the modern world, it has underpinned centuries of enslavement, justified genocide and been used to decide the demarcation line between who lives and who dies, who gets to access rights of citizenship ...

Akala (2018) *Natives: Race and Class in the Ruins of Empire*. London: Two Roads. p. 26, 29, 34-35.



Second, there is the invitation to be seen as disordered, as malfunctioning, as aberrations of the norms of the social world of academic research: “wherever the majority of actors assumes a natural order, those who base their reasoning in an alternative order immediately appear as ‘disordered’” (Straehler-Pohl et al., 2018, p. 4). But we, too, of course, by writing for an academic journal, are part of institutionalising and ordering that aberration.

We cannot avoid such entanglements. So, should we abandon the field? Perhaps. But, aware of “the feeling of helplessness in not being able to change anything at all” (Sriraman, quoted in Straehler-Pohl et al., 2018, p. 4), of the fact that “hopelessness leads to wordlessness” (Berger, 2016, p. 112) and of dis-utopia as “the most significant project of our time ... the political celebration of the end of social dreams” (Dinerstein & Neary, quoted in McLaren, 2000, p. xxv), we have chosen instead to stay and to attempt to draw attention to the complexities and contradictions inherent in writing articles acceptable for academic publishing whilst arguing for challenging the very foundations of the *status quo*.

Our contribution includes some uncertainty and lack of resolution: critical knowledge is “persistently open, disclosive, incomplete and open-ended” (McLaren, 2000, p. 186) and this uncertainty and indeterminacy extends beyond knowledge alone to include the foundations for political actions (Skovsmose, 2014). We want to challenge “the learned modern/colonial desires for consensus, coherence, neutrality and quick resolutions” (Andreotti et al., 2018, p. 12).

We adopt a little disorder as a way of being both “in and against” (London Edinburgh Weekend Return Group [LEWRG], 2010, n.p.) the social world of academic research. Those of us who work for the state, as academics inevitably do, must “find ways to oppose it from within our daily activity, which means breaking out of the social relations in which the state involves us” (LEWRG, n.p.): as researchers this involves us in challenging the accepted norms, social relations and embedded and ‘natural’ ways of thinking, writing and practising research, in not doing what we are supposed to do but otherwise. This we have tried to do – “If we don’t push back, we will be pushed over” (LEWRG, 2010, n.p.) – despite all the inherent complexities, inconsistencies and contradictions in being both ‘in’ and ‘against’. Being ‘in and against’ requires that activism is not confined to “evenings and weekends... [lest] like Penelope in the Greek myth, we stitch the tapestry of bourgeois society every day and attempt each night to unravel it before dawn” (LEWRG, 2010, n.p.). A rebellious state of mind is required (see Extinction

Rebellion, 2019), one which demands a fairer, more just, ecologically sustainable and more loving world, seeking out the interstices – the gaps, openings, crannies, crevices and chinks – through which moves against co-option and ordering may be inserted.



Citizens of nowhere

Prime ministers line up to offer super-rich passports - at a price

Three prime ministers took to the stage at a five-star London hotel ... to offer the world's wealthiest people "golden passports" and citizenship in return for hundreds of thousands of pounds ... [the prime minister of St Lucia] promised ... visa-free travel to 145 countries including the UK, members of Europe's Schengen area, Hong Kong and Singapore.

The Guardian, 16 Nov 2019, p. 45

As noted above, both the editors and our kind reviewers have, entirely reasonably, demanded that we explain ourselves and justify our place here. At the same time, one of our reviewers offered that “making someone write their own justification / critique is a practice associated with repression ... all too often it is only the norm that does not have to justify itself”; but, nevertheless, we are arguing for an ‘in and against’ positioning and half of that is being ‘in’! So here we have tried to supply in a more or less orderly way, conforming to the current order of published mathematics education research, some explanation and justification for our approach despite leaving reviewers with unreconciled difficulties: there is bound to be “a fundamental uncertainty” (Straehler-Pohl et al., 2018, p. 5) about the review process. We assert, *pace* one of our reviewers, that interrupting, disturbing, unsettling may be the best we can do; and this is a not unreasonable goal by which to be judged.

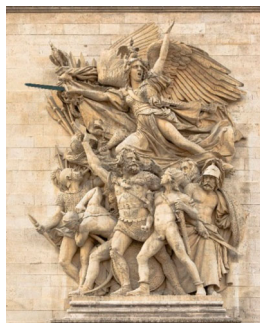
Problematic discourses: mathematics and (global) citizenship

As noted above, in PiCaM, curriculum resources for teachers were to be designed to embed global learning content and participatory approaches in the teaching of mathematics. Thus, participating in the project, we found ourselves enmeshed in (at least) two problematic discourses: mathematics and (global) citizenship, interacting with each other and functioning as an assemblage structuring our work. Before interrogating these discourses, we share some of the troubling questions that arose in our discussions and email exchanges within the project as we worked together on the principles we adopted to guide us and on the curriculum materials we were devising, questions intended to critique our actions and our intentions:

- Is it possible to frame global learning and social, civic and intercultural skills, knowledge and understanding in ways that support an emancipatory project for both teachers and children?
- In what ways can school-based pedagogies ever become aware of their inclusive and exclusive potentials?

- What characteristics cluster around the notion of radical citizenship in contemporary times and places of globality?
- What role can curriculum materials have in a pedagogy genuinely focused on the needs of children and teachers?
- Can we conceive of the materials as having a life of their own in the hands of teachers and children producing unpredictable openings for encountering the multiple other?
- If we move from the situated and local to more general curricula artefacts and pedagogic interventions, how do we move beyond reproducing the same cultural, linguistic, gendered, raced and ethnic stereotypes and hegemonies?

The purpose of the questions was to trouble us as, mindful of and sympathetic to the injunction that “sometimes the best way to act is to stop ‘acting’ ... and ruminate” (Pais & Costa, 2020, p. 12), we nevertheless tried to find a way that something limited and partial might be done even within an education system “the major purpose of [which] is to make the world safe for global capitalism” (McLaren, 2000, p. 196). We return later to the issue of what might be done.



*Aux armes, citoyens,
Formez vos bataillons,
Marchons, marchons!*

To arms, citizens,
Form your battalions,
Let's march, let's march.

From the French national anthem.

Mathematics

Mathematics currently acts as a powerful political tool supporting the neo-liberal governing elites, formatting how we understand the social world (Skovsmose, 1994) and therefore our place in it as citizens. Mathematical models are presented in the context of political decision making without reference to the preconditions of the modelling process and with the mathematics providing a neutral and apparently value-free tone, a place free of doubt, unquestionable, “controlling, regulating, and disciplining... [with] governing rules and technologies of quantities, such as precision and accuracy to tame uncertainty” (Yolcu & Popkewitz, 2019, p. 253). The mathematics is portrayed as “independent of human discursive and material practices. ... Instead, its socio-historical character in the making of significant contributions towards conceiving and organizing modernity needs to be appreciated as culturally and politically situated” (Chronaki, 2011, p. 208).

The policies resulting from mathematical modelling are seen as being “unquestionable practical reality, a necessary evil” (Ernest, 2016, p. 8), despite the significant harm that mathematics does in the world. For example, through the use of computer software, highly sophisticated weaponry is deployed by the rich against the poor, remote controlled

combat aerial vehicles against slingshots (Berger, 2016); or the use of mathematical algorithms within predictive policing creating self-reinforcing feed-back loops likely to support anti-black violence and oppression (Burke, 2020).

Mathematics is understood as a “motor of progress” (Valero, 2017, p. 117) where progress is understood as the exploitation of the earth to generate the never-ending accumulation of capital (Arendt, 1951/2017, p. 186). This view of industrial progress through technological improvement has educational parallels with mathematics remaining implicated in maximising capital, this time human capital. Mathematics is used to order and rank young people leading to the justification and legitimisation of social stratifications and the consequent allocations of advantage and disadvantage. It forms the basis of the “micro-disciplinary techniques” (Hall & Noyes, 2009, p. 851) used to judge and discipline children, teachers and schools and provides “analytics’ that ‘drill down’ to individual students and that create comparisons with hundreds of other schools” (Povey & Angier, 2021) (see SISRA Services | School’s Data Solutions Provider | SISRA Ltd). Suites of complex statistical measures based on tests and mathematically analysed demographic data are produced and learners become “a cell on a spreadsheet coloured red, amber or green or a labelled co-ordinate on a two-way grid” (Povey & Angier, 2021). These “operate under a ... logic of human capital management [within which] ... cognitive capital, intelligence, school achievement, and math competence are being connected as prerequisites and predictors of social progress, economic growth, and citizenship” (Valero, 2017, p. 121). And global agencies endlessly produce statistics to promote educational reforms demanded by neo-liberalism without any proof that these improve the quality of education (Nikolakaki, 2020).

Mathematics curricula have been co-opted in the service of prevailing discourses of mathematics and of citizenship, becoming “an important technology to steer the making of the new type of desired citizen and worker” (Valero, 2017, p. 128). Valero argues that in the policy systems that developed from the middle of the twentieth century, constructs such as mathematical achievement and the associated measurements, rankings and subsequent in(ex)clusions mean that school mathematics education is not just about learning mathematics but about the making of certain types of people, those who have technological skills and can contribute to economic growth, with mathematics education “cultivat[ing] the inner qualities of individuals who were to embody a particular way of being and acting as self-governed citizens” (Yolcu & Popkewitz, 2019, p. 245).

Mohammed El-Hamisi saved 48 people on his fishing boat. “That night the winds were up to 10 on the Beaufort scale, so it was very choppy. And there was smoke everywhere; visibility was nil ... I decided to leave instantly.” He had lived in Greece since he was 17; he has since been granted Greek citizenship but has received no compensation for the damage to his boat. He is still paying off the debt. “Lots of people ask me what they can give because I saved their families. But how can I accept anything from people who’ve lost everything?”

The Guardian, 20 July 2019.



Overall, mathematical thinking with its apparent certainties and neutrality easily provides “a training in ethics-free thought” (Ernest, 2016, p. 6) with a focus on technical means rather than ethical ends:

it is not only animal and plant species which are being destroyed ... but set after set of our human priorities. The latter are systematically sprayed, not with pesticides, but with ethicides – agents that kill ethics and therefore any notion of history and justice. Particularly targeted are those of our priorities which have evolved from the human need for sharing, bequeathing, consoling, mourning and hoping... (Berger, 2016, p. 83)

Mathematics – “the discipline most readily associated with colonialism and imperialism” (Appelbaum, 2007, p. 233) – thus employed de-sensitises us to human and ethical values and erases our connection with the ‘other’.

So why mathematics? We believe that we need to unlearn – to rewild if you will – both these “hegemonic images” (Chronaki, 2011, p. 222) of mathematics and our destructive relationship with the subject. We need mathematics as part of a critique of contemporary political arrangements (precisely because of its formatting power) as we try to function as radical citizens, caring for each other and for the planet; the young need mathematics in shaping policies which bring greater fairness to the world and which help to re-green the planet. And we need a mathematics that can contribute to our understanding of the world as a mysterious and beautiful place and an awareness that it can delight us and allow our creativity to flourish within its realm.

(Global) citizenship

Although *PiCaM* was framed in terms of global citizenship, as we came to reflect on the project (and prompted by one of our reviewers), it became clear that, largely, European citizenship and Westernised concepts of citizenship were actually being deployed. (We suspect the same is true in most policy contexts, for example, that of the Organisation for Economic Co-operation and Development (OECD)). The following discussion starts with citizenship and then moves easily into European citizenship from which, we argue, it differs little. We then summarise strands of global citizenship to be found in the sphere of mathematics education.

Citizenship is a complex and elusive concept, and one which is inherently political. It is something that can be acquired at birth, or bestowed in gratitude for selfless bravery, or taken from you as a punishment, or act as a defining characteristic in a rallying cry to arms, or withheld because of the colour of your skin or your sex or your economic status, or bought by the wealthy, or ... The concept is slippery, dangerous and contested and is employed in shifting and competing discourses about civil society and the social good.

In mathematics education, as elsewhere, the idea of citizenship, with its so-called rights and obligations, can be, and is, most often used in ways that support an inherently conservative agenda: the good citizen as individual, conforming, law abiding and accepting of the *status quo*. This neo-liberal citizen is required to be an autonomous, rational, mathematical individual who is active and entrepreneurial and who has a global reach, one who fashions their own identity, and performs self and citizenship and mathematics without reference to the social-political context; equal opportunity, meritocracy and ‘maths for all’ are frequently invoked (Valero, 2017). This citizen

must fabricate themselves as “capable of gearing growth and, with it, a competitive, now global economy” (Valero, 2017, p. 118): mathematics is central to the making of these “productive worker citizens” (p. 128). Modernity, through capitalism and industrialisation, demands a ‘mathematically competent’ citizen (Yolcu & Popkewitz, 2019).

Clashes across India over new citizenship bill ‘that excludes Muslims’

There were violent clashes in Dehli ...over a new citizenship bill that critics say discriminates against Muslims and undermines the secular foundations of India ... the United Nations human rights office also voiced concern that the new citizenship law was ‘fundamentally discriminatory in nature’ ...
The Guardian, 14 December, 2019



The ‘rights’ of this citizen are entirely individual: the freedom to exercise choice in the market, without regard to the welfare of others, and the freedom to consume. As Stuart Hall has it, “Economic Man or as s/he came to be called, The Enterprising Subject and the Sovereign Consumer, have supplanted the idea of the citizen and the public sphere” (1998; quoted in McLaren, 2000, p. 19). There is no place within neo-liberal citizenship for knowledges of the ‘other’. It marginalises some citizens or doesn’t recognise them at all and maintains the culturally dominant. Like mathematics, the way that citizenship is conceptualised is often gendered (McIntosh, 2004) or raced (Andreotti et al., 2018) or Eurocentric (Weiner, 2002) or all three. For example, in the Magna Carta of 1830 in Uruguay, citizenship was denied to “women, the illiterate, slaves, and anyone who was ‘a paid servant, a day laborer, or a rank and file soldier’” (Galeano, 2009, p. 200).

Traditionally, the idea of the citizen was bound up with the idea of the nation state but the neo-liberal discourse can be and is extended to include European (and global) citizenship, with the citizen as one empowered to exploit global opportunities. To provide the radical interpretation of citizenship required, we reject the idea that the prevailing concept can be extended or expanded or added to (Pashby, 2011, p. 427). Rather, such an approach leads to system expansion or system revamping (Andreotti et al., 2018, p. 32) instead of a recognition that the system itself (and the use of mathematics within it) is the problem, a system where “social injustice is not an error to be corrected, but an essential requirement of the system” (Pais & Costa, 2020, p. 7), a system based on “the violence of exploitation, ecoside, and genocide” (Andreotti et al., 2018, p. 28) within each of which mathematics is implicated. In other words, a radical citizenship means a rejection of existing social and political

power relations.



Dual national terror suspect ‘Jihadi Jack’ is stripped of UK citizenship

Jack Letts, who left his home in Oxfordshire to join Islamic State five years ago, has been stripped of British citizenship ... prompting a row with Canada, from where he also holds a passport.

The Guardian, 19 August, 2019

As well as this explicitly political dimension, we suggest radical citizenship (and a reimagined mathematics) also has a moral dimension, one which is always connected to the political. It requires the person-centredness, empathy and human values currently advocated by many of those engaged in anti-globalisation movements who are striving for a deep ecological democracy that stresses interconnectedness (Williams, 2019), not just between people but with mathematics and the planet too. It is a citizenship (and a mathematics) which recognises personhood and strives to create and maintain “ethical, equitable relations premised on respect, reciprocity, solidarity to uphold the well-being of present and future generations” (Andreotti et al., 2018, p. 31).

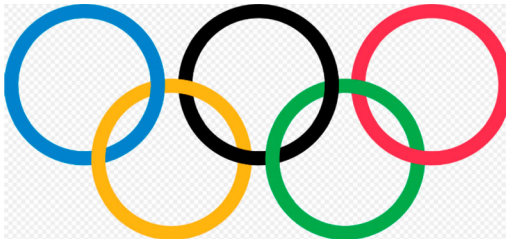
Mathematics education, citizenship education and *PiCaM*

In this section, we consider *PiCaM* and its learning resources (<http://www.citizenship-and-mathematics.eu/>) within the context of mathematics and citizenship education, returning to and reflecting upon the troubling questions raised earlier.

For most learners, mathematics classrooms in capitalist societies are alienating places where they experience inequity and exclusion (Pais, 2017). The mathematics is abstract, formal and cold with no room for creativity, mutuality, enjoyment or playfulness. Based on modernist, Taylor-esque understandings of time (Povey, Boylan, & Adams, 2019), being able to do things quickly is of central importance. Mathematics classrooms demand ‘excellent teachers’, a concept difficult to argue against even as we observe it stifling creativity as teachers strive to reach ever higher ‘standards’ as they work to produce the ‘good citizen’. Through *PiCaM*, as in Chronaki’s teaching experiments, “our efforts resemble the ‘norm’ of school mathematics ... and at the same time, they seek to create a ‘utopian’ space that troubles this very normality” (Chronaki, 2011, p. 209). Returning to one of the troubling questions raised, that of the role that curriculum materials might have in a pedagogy genuinely focused on the needs of children and teachers, we add the further challenge (for teachers) of struggling towards such pedagogical goals within existing school settings. We found no way effectively to resolve the inherent contradiction between these two, though we caught glimpses that, for the teachers at least, working with the materials themselves did provide occasional moments of liberation.

Designing curriculum artefacts for teachers is, in itself, problematic: they may be conceived of as unchangeable or as being the subject of an other’s specific intentionality,

things with unwarranted authority demanding compliance. The materials needed to function as openings to create spaces for interaction, for dialogue, or as creative experimentations that would allow teachers and children from the margins to tell their own stories. Yet, for some of the teachers we worked with, these openings were inaccessible, restricted in varying degrees by the demands of performativity. The more open and dialogic the materials – for example, *Playing and making mathematical games and crafts: Spaces for coming together* – the less the teachers were likely to choose to work with them in this way with their children.



Migrant runs for a new life

It took teenager Kone Yossodjo more than a year to run from poverty in west Africa ... If he can meet the 1,500m Olympic qualifying time, his coach says, Spain will grant him citizenship to compete.

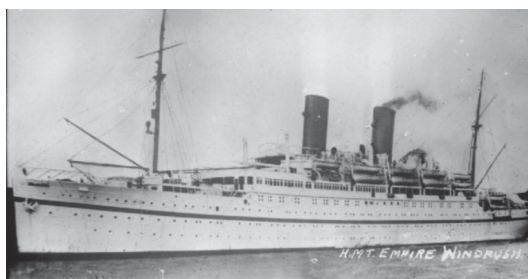
The Guardian, 15 November, 2019

A wide-ranging variety of discourses of global citizenship is to be found in the sphere of (mathematics) education within which we identify four strands: citizenship for global capitalism which draws explicitly on neo-liberal values, operating in contradiction to radical ones (Department for Education, 2013); citizenship for global communication which accepts and provides no challenge to the *status quo* (OECD, 2018); citizenship for democratic participation which includes reference to justice and human rights (Oxfam, n.d.); and citizenship for transformative action which references decolonisation, ecologism, fair and sustainable development, feminism and transnational activism (Andreotti et al., 2018; Pashby, 2011). It is possible to employ any of these discourses in the service of maintaining the existing system. However, we suggest, the last two of these, though colonisable by neo-liberalism, can also be excavated from the “rubble of words” (Berger, 2016, p. 7) and help us in reclaiming the concept of citizenship, but without any certainties or guarantees.

For example, in *Global crisis and local solidarity*, the uses of mathematics are problematised and hegemonic narratives about debt and money are challenged, encouraging interconnectedness and solidarity. Here the move from the situated and local is directed towards a critical engagement with neo-liberal economics but with a strong local voice that appeared to us to avoid stereotyping. But the material could be used to focus on the ‘good’ citizen, managing their personal finances well in the service of capitalism. *Mapping our world* is designed to question the rise of the nation state and to draw attention to historic colonialism, showing how mathematics can shape our understandings in hidden ways and raising questions about how citizens are created. But the materials could instead focus on closed and traditional mathematics and form part of a narrative in support of the ingenuity of mercantile capitalism. *Fair and square* recognises and intends to give value to artistic, cultural, philosophical and mathematics traditions other than western Protestantism; but rather than providing a space for children from the margins it is possible for these to be exoticized and used to foster colonial attitudes of benevolence.

In terms of the potential for inclusive/exclusive pedagogies, this remains an irreconcilable contradiction. This is exemplified by *Mathematical bodies*. The intention is to explore mathematics as embodied and playful and experienced together with an explicit focus on building a learning group where everybody matters and everyone has an equal role to play. But for children who have a physical disability, this pedagogical approach has the potential to further their marginalisation.

So we return to our first troubling question: is it possible to frame global learning and social, civic and intercultural skills, knowledge and understanding in ways that support an emancipatory project for both teachers and children? We have to answer: we do not know. It is more than possible to use *PiCaM* resources adopting an accommodating or reforming approach. But despite the difficulties and dilemmas discussed above, and remaining inconclusive, perhaps the project materials might be used by teachers and children to create glimpses of what might be. And we hope that our disorderly reflections might contribute to helping us as a research community maintain our commitment to uncertainty.



The Windrush scandal

British citizens were wrongly deported to countries they had left as children fifty years ago, held in immigration detention centres, dismissed from their jobs and deprived of services such as NHS care. The official inquiry said the Home Office demonstrated “institutional ignorance and thoughtlessness towards the issue of race” and operated a “culture of disbelief and carelessness.”

Concluding remarks

It will not be capitalism nor the capitalist state which fixes the problems that capitalism and the capitalist state have created (Andreotti et al., 2018, p. 29). We live in a globalised era of, not least, ecological crisis, war, enforced mobility across borders, hunger, exploitation, pervasive colonialist assumptions and practices, racism and expanded powers of the police and the military: each of these is implicated in the construction of a neo-liberal version of citizenship, often aided and abetted by mathematics. We are in a

‘new dark age’ ... characterized by domination by brutal ruling elites ... hegemonic ideologies, fundamentalisms, a growing denial of both human rights and democratic working conditions ... a conservative often reactionary culture, ignorance and ‘miseducation’ ... [leading] to feelings of helplessness, alienation and surrender. (Nikolakaki, 2020, p. 309)

We believe, however, that, despite the incorporation of the idea of the citizen into the neo-liberal world, it still has the potential to evoke more human and more humane inter-connections with others (Andreotti et al., 2018). The call for papers for this special issue refers to the (im)possibility of mathematics education to which we would add the (im)possibility of working with the concept of citizenship. But we argue for the need to act in the world whilst seeing the dangers inherent in an approach which seeks to fix and solve. Andreotti and her colleagues ask:

What pedagogical frameworks might support a relationship to knowledge that is not constrained to description ... and then prescription ... and instead towards holding and working with and through complexity and uncertainty? (2018, p. 30)

We offer no answer to this question – “being critical and being doubtful become integrated” (Skovsmose, 2007, p. 172) – but simply try to hold onto the complexities and contradictions of our own position, adopting a messy approach and searching for the stamina and strength required to unlearn our investments in the *status quo* (Andreotti et al., 2018). Our language has been colonised by neo-liberalism – even ‘social justice’ finds a place neo-liberal politics (Department for Work and Pensions, 2012) – and we need to find new ways of expressing ourselves (Monbiot, 2017), having been left with just a “rubble of words” (Berger, 2016, p. 7).



Joe, 13, Dominican Republic

Despite a clear entitlement to nationality under the law, children of Haitian descent have frequently been denied Dominican nationality by the civil registry. Joe should be considered a Dominican national as he was born in the country, but he has never been able to obtain his ID. He spends his school vacations scavenging in San Pedro de Macoris rubbish dump in order to earn 50 pesos (just over one USD).

[UNHCR - The kids foraging for a future](#)

We recognise the utopianism of a project like *PiCaM*, negatively insofar as appearing to offer a plan of action but positively in pointing to a social dream on the horizon. With every step we take, the horizon recedes – “So what purpose does Utopia serve? Well, it serves the purpose of moving us forward” (Birri, quoted in Potts, 2017, p. 16). We defend this Utopianism in the face of neo-liberalism’s commitment to dis-utopia that serves the interests of the powerful through the fostering of helplessness and hopelessness. Rather, we argue for a hopefulness that citizenship can become about care and interconnection, with mathematics helping us to enable this and to experience delight and mystery in the world, a hopefulness “that the good and the beautiful will somehow thrive, that there is a future after all” (Vlieghe & Zamojski, 2019, p. 163). Because the world is essentially open and incomplete, there is space for hope. We need a radical hope because it is “our best weapon against despair” (Nikolakaki, 2020, p. 321). We need a hope that is active not passive: Gary Younge (2020), quoting Martin Luther King, alerts us: “‘the arc of history is long but it bends towards justice’ – but it doesn’t bend by itself. It’s up to us to make it” (Younge, 2020, n.p.). And we also need hope-in-the -present (Povey & Angier, 2021) because “radical hope is not so much something you have but something you practice” (Nikolakaki, 2020, p. 321).

What does this mean for mathematics education? It is part of our argument that such specifying closes down possibilities whereas the way ahead is messy and fraught with contradictions. However, in a context of uncertainty, openness and indeterminacy, this might mean we enact interconnectedness between and respectfulness for persons, with approaches that bring us back to our bodies and ourselves, using mathematics to critique and change the world and to take joy in it; and we might find the opportunities that mathematics education can provide to engage in a citizenship understood as

solidarity in the here and now and as enabling just practices and transformational action by young people to build a better world.

Addendum

We have used two devices to make the consumption of this research text more self-conscious for the reader, to push back a little in the process of research production, to not do what we are supposed to do. Both are intended to point to the “contradiction ... between object [this text] and the processes and human relationships they mask” (Swanson, 2017, p. 248) as we attempt to “critique and disrupt cherished notions embedded in the field, and to ‘speak truth to power’” (Nolan & de Freitas, 2007, p. 1).

The manufacture of an academic text involves a (power-drenched) dialogue between, usually, editors, reviewers and authors; but this dialogue, even when its existence is acknowledged, remains invisible. Despite this erasure, the dialogue plays a significant role in creating and disciplining the field and acts as part of the reification of the social processes of argument and inquiry into a commodity of the research industry. Here, we have asked the reader to bring this to mind by sharing some of that conversation and our deliberations as we respond.

We have interrupted the text with images without comment in a process reminiscent of montage: “the montage methodology deliberately makes the role of the author more explicit” (Swanson, 2017, p. 240), a form of representation that “[flies] in the face of more traditional forms of research text” (Nolan & de Freitas, 2007, p. 3) and helps underscore its fabrication. In the revised version of the text, Hilary played with the idea of asking provocative questions next to the images but Gill thought that the interruptions without comment were more disruptive, simply because the reader was required to work out for themselves what to do/how to think with them, without that thinking being scaffolded, directing and perhaps containing it. We decided to remain with the ‘invasions’, “highlighting textual performance and non-linearity in an attempt to interrupt the reader along the journey of coming to know” (Nolan & de Freitas, 2007, p. 7) with the “deliberate decontextualization” (Swanson, 2017, p. 246) as more likely to unsettle consumption.

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References

- Andreotti, V., Stein, S., Sutherland, A., Pashby, K., Susa, R., & Amsler, S. (2018). Mobilising different conversations about global justice in education: Toward alternative futures in uncertain times. *Policy & Practice: A Development Education Review*, 26, 9–41.
- Appelbaum, P. (2007). Afterword: Bootleg mathematics. In E. de Freitas & K. Nolan (Eds.), *Opening the research text: Critical insights and In(ter)ventions into mathematics education* (pp. 221–247). Springer Science & Business Media.
- Appelbaum, P. (2017). Disordered order, ordered disorder: Threads, folds, and artistic action. In H. Straehler-Pohl, N. Bohlmann, & A. Pais (Eds.), *The disorder of mathematics education: Challenging the socio-political dimensions of research* (pp. 273–290). Springer.
- Arendt, H. (1951/2017). *The origins of totalitarianism*. Penguin.
- Berger, J. (2016). *Hold everything dear: Dispatches on survival and resistance*. Verso.
- Burke, L. (2020, June 24). Mathematicians urge ending work with police. *Inside Higher Ed*. <https://www.insidehighered.com/news/2020/06/24/mathematicians-urge-cutting-ties-police>
- Chronaki, A. (2011). ‘Troubling’ essentialist identities: Performative mathematics and the politics of possibility. In M. Kontopodis, C. Wulf, & B. Fichtner (Eds.), *Children, development and education: Cultural, historical and anthropological perspectives* (pp. 207–227). Springer Science.
- Department for Education. (2013). Statutory guidance: National curriculum in England: Citizenship programmes of study for key stages 3 and 4. <https://www.gov.uk/government/publications/national-curriculum-in-england-citizenship-programmes-of-study/national-curriculum-in-england-citizenship-programmes-of-study-for-key-stages-3-and-4>
- Department for Work and Pensions. (2012). Social justice: Transforming lives. GOV.UK. www.gov.uk
- Ernest, P. (2016). The collateral damage of learning mathematics. *Philosophy of Mathematics Education Journal*, 31. *Philosophy of Mathematics Education Journal* edited by Paul Ernest (exeter.ac.uk)
- Extinction Rebellion. (2019). Declaration of rebellion. In C. Farrell, A. Green, S. Knights, & W. Skeaping (Eds.), *This is not a drill: An Extinction rebellion handbook* (pp. 1–2). Penguin Random House.
- Galeano, E. (2009). *Mirrors*. Portobello Books.
- Hall, C., & Noyes, A. (2009). New regimes of truth: The impact of performative school self evaluation systems on teachers’ professional identities. *Teaching and Teacher Education*, 25(6), 850–856.

- Jones, L., & Moore, R. (1993). Education, competence and the control of expertise. *British Journal of Sociology of Education*, 14(4), 385–397.
- London Edinburgh Weekend Return Group. (2010). In and against the state. <https://libcom.org/library/against-state-1979>
- McIntosh, P. (2004). Gender perspectives on educating for global citizenship. In N. Noddings (Ed.), *Educating citizens for global awareness* (pp. 22–39). Teachers College Press.
- McLaren, P. (2000). *Che Guevara, Paulo Freire, and the pedagogy of revolution*. Rowman & Littlefield.
- Monbiot, G. (2017, August 9). Forget ‘the environment’: We need new words to convey life’s wonders. *The Guardian*. <https://www.theguardian.com/commentisfree/2017/aug/09/forget-the-environment-new-words-lifes-wonders-language>
- Nikolakaki, M. (2020). The hope of critical pedagogy in the new Dark Ages of neoliberal globalization and imperialism. *Journal for Critical Education Policy Studies*, 18(1), 299–334.
- Nolan, K., & de Freitas, E. (2007). Foreword. In E. de Freitas & K. Nolan (Eds.), *Opening the research text: Critical insights and in(ter)ventions into mathematics education* (pp. 1–11). Springer Science & Business Media.
- Organisation for Economic Co-operation and Development (OECD). (2018). Preparing our youth for an inclusive and sustainable world: the OECD PISA global competence framework. [global-competency-for-an-inclusive-world.pdf](https://www.oecd.org/pisa/data/global-competency-for-an-inclusive-world.pdf).
- Oxfam. (n.d.). Maths and Global Citizenship: A guide to help teach maths with a global citizenship approach. openrepository.com
- Pais, A. (2017). The narcissism of mathematics education. In H. Straehler-Pohl, N. Bohlmann, & A. Pais (Eds.), *The disorder of mathematics education: Challenging the socio-political dimensions of research* (pp. 53–63). Springer.
- Pais, A., & Costa, M. (2020). An ideology critique of global citizenship education. *Critical Studies in Education*, 61(1), 1–16.
- Pashby, K. (2011). Cultivating global citizens: Planting new seeds or pruning the perennials? Looking for the citizen-subject in global citizenship education theory. *Globalisation, Societies and Education*, 9(3-4), 427–442.
- Potts, R. (2017, December–January). Daring to dream. *Red Pepper*, pp. 15–16.
- Povey, H., & Angier, C. (2021). Against ‘progress’. *Forum*, 63(2), 20–31.
- Povey, H., Boylan, M., & Adams, G. (2019). Regulated time and expansive time in primary school mathematics. *Pedagogy, Culture and Society*. <https://www.tandfonline.com/doi/full/10.1080/14681366.2019.1692059>
- Povey, H., & Burton, L. (1996). Competency in the mathematics classroom - the example of equal opportunities. In D. Hustler & D. McIntyre (Eds.), *Developing competent teachers - Approaches to professional competence in teacher education* (pp. 128–140). David Fulton.
- Skovsmose, O. (1994). *Towards a philosophy of critical mathematics education*. Kluwer.
- Skovsmose, O. (2007). Mathematics education in a knowledge market: Developing functional and critical competencies. In E. de Freitas & K. Nolan (Eds.), *Opening the research text: Critical insights and in(ter)ventions into mathematics education* (pp. 159–188). Springer Science & Business Media.
- Skovsmose, O. (2014). *Critique as uncertainty*. Information Age Publishing.
- Straehler-Pohl, H., Lensing, F., Pais, A., & Swanson, D. (2018). Preface: The disorder of mathematics education, part II. Critique, imagination and play. *The Mathematics Enthusiast*, 15(1/2), 3–7.
- Swanson, D. (2017). Expressions of the commodity form: Alienation and mathematics education. In H. Straehler-Pohl, N. Bohlmann, & A. Pais (Eds.), *The disorder of mathematics education: Challenging the socio-political dimensions of research* (pp. 273–290). Springer.
- Swanson, D. (2018). Vernacular: A montage of mathematical graffiti, quotations and commentary. *The Mathematics Enthusiast*, 15(1/2), 133–147.
- Valero, P. (2017). Mathematics for all, economic growth, and the making of the citizenworker. In T. Popkewitz, J. Diaz, & C. Kirchgasser (Eds.), *A political sociology of educational knowledge: Studies of exclusions and difference* (pp. 117–132). Routledge.
- Vlieghe, J., & Zamojski, P. (2019). *Towards an ontology of teaching*. Springer Nature.

- Weiner, G. (2002). Europe, feminism and teacher education: Mapping the debates. *Review Journal of Philosophy and the Social Sciences*, 27, 298–317.
- Weise, K. (2021, January 26). Microsoft profits jump 33 percent as pandemic continues shift to cloud computing. *The New York Times*. Microsoft profits jump 33 percent as pandemic continues shift to cloud computing. *The New York Times*. nytimes.com
- Williams, R. (2019). Afterword. In C. Farrell, A. Green, S. Knights, & W. Skeaping (Eds.), *This is not a drill: An extinction rebellion handbook* (pp. 181–184). Penguin Random House.
- Yolcu, A., & Popkewitz, T. (2019). Making the able body: School mathematics as a cultural practice. *ZDM*, 51, 251–261.
- Younge, G. (2020). Black Lives Matter and the question of violence. *Double Down News*. <https://www.doubledown.news/watch/2020/5/june/black-lives-matter-george-floyd-the-question-of-violence-gary-young>